Shipbuilding and Fitting-out Number

MARINE ENGINEERING of Canada

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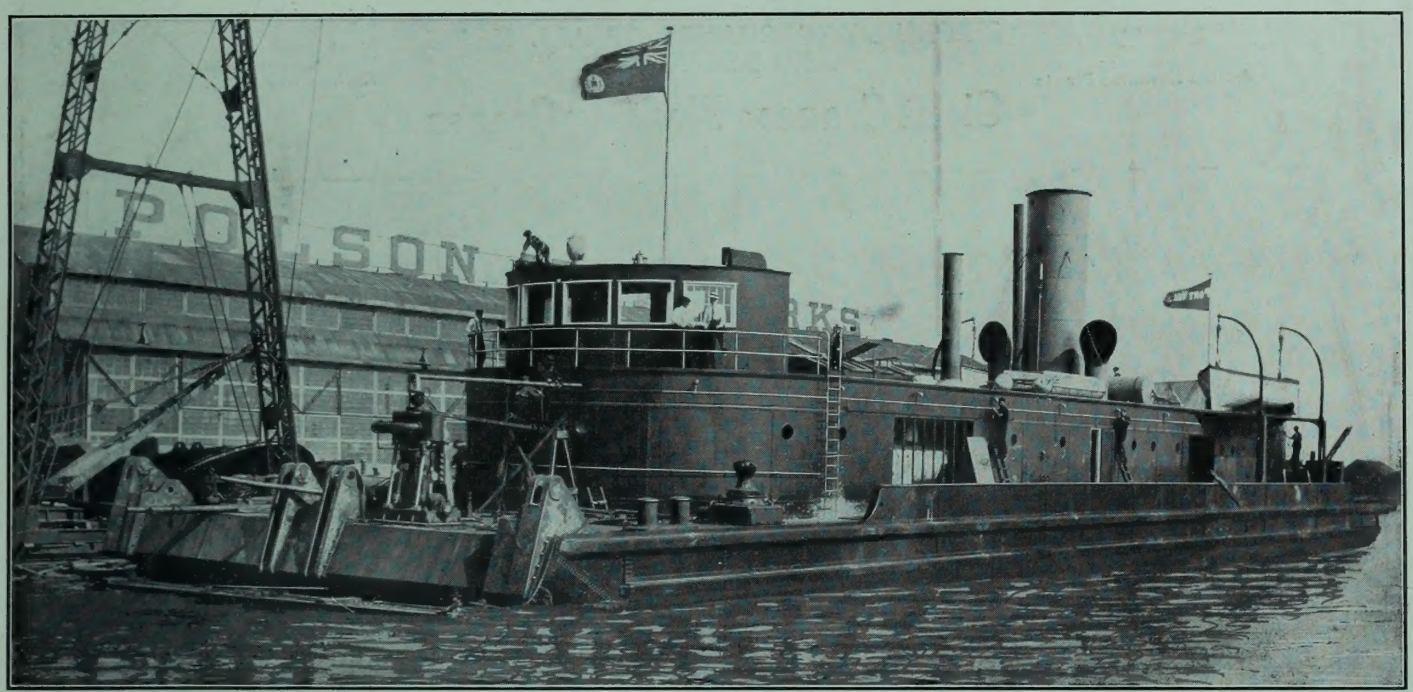

Dredge "Port Nelson" Built by Polson Iron Works Limited, of Toronto

Order placed by Department of Railways and Canals, Dominion Government on the 1st day of April, 1913. Dredge reached Port Nelson after voyage of 3500 miles on the 27th of September.

T. W. No. 1.

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Col Miller

Polson Iron Works Limited, TORONTO ONT.

Dredge portnelson in spite of many difficulties encountered enroute arrived safely on Saturday twenty seventh time of passage sydney bar to portnelson bar twenty days six hours. Dredge behaved splendidly throughout voyage congratulate you on output.

H.B.Saunders

1010am

Telegram sent by Captain Saunders, the well-known marine surveyor and wrecking master, who was placed by the Department in full charge of towing of dredge to Port Nelson.

The advertiser would like to know where you saw his advertisement—tell him.

The World's Shipbuilding and Marine Engineering in 1913

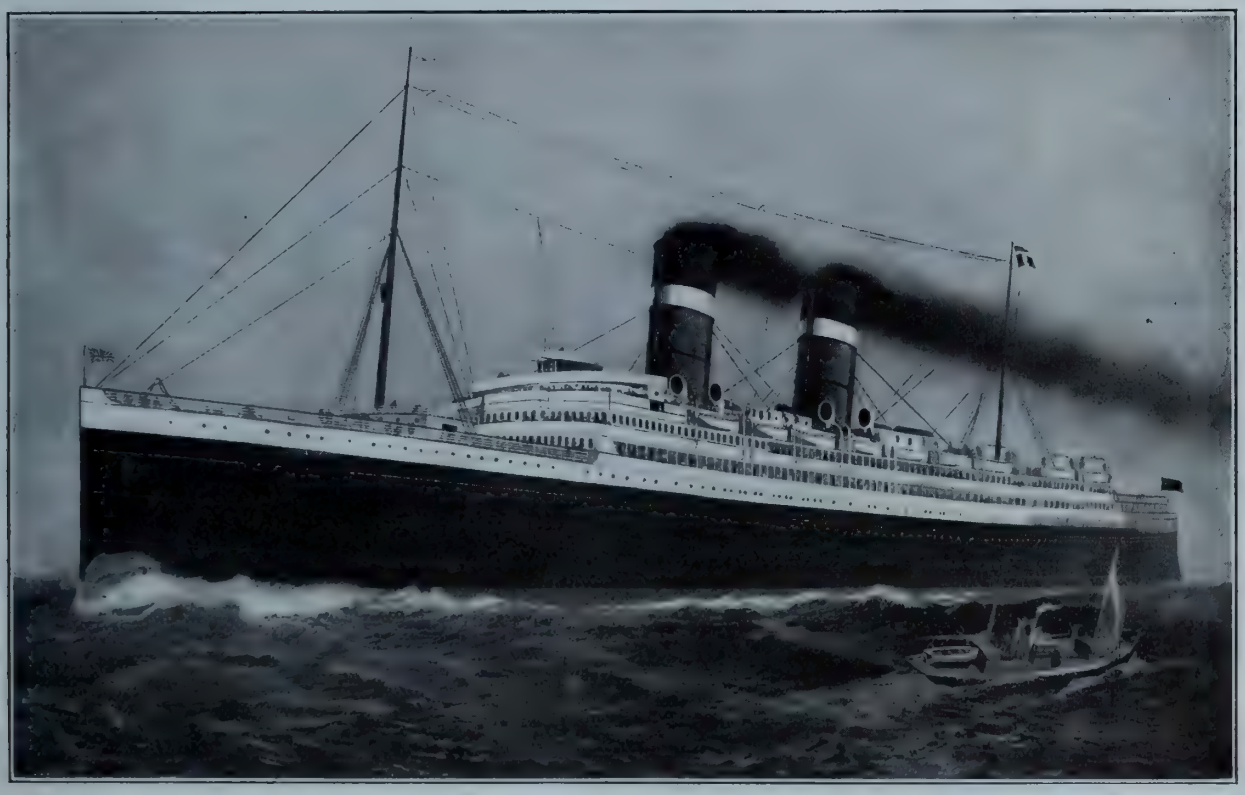
The extraordinary development and progress here recorded in the twin spheres of shipbuilding and marine engineering over a world-wide area are to say the least, remarkable, and to us who are citizens of the Dominion of Canada, there is borne home forcibly the insignificance of the contribution made, also the material loss through the indifference displayed towards the propagation of these and their co-related industries.

THE British Empire and particularly that section of it so familiarly dubbed "The Old Country," still maintains its place and prominence in the realm of shipbuilding and marine engineering. It is only natural, therefore, that such data and statistics as are available concerning the "Motherland," her colonies and dependencies, relative to the foregoing industries should be given their rightful setting. It should be noted, however, that development and achievement, and even record, are not being monopolized by Great Britain, but that strenuous and sustained effort in these directions by other countries is becoming each year more apparent. We in Canada have not yet become sufficiently enthused with, nor do we yet realize the importance to our commercial and industrial standing among the civilized and progressive nations of the world what due regard to the establishment and nurture of shipbuilding, and marine engineering would accomplish for us. The observations, data and illustrations which follow, and which have been gathered from a variety of authoritative sources, are such as to fill us with pride because of the work of our kinsmen, and to arouse within us the desire, in the early future, to develop along similar lines.

Prosperity the Keynote.

Prosperity is the note which sounds through all the records of the trade of 1913. In practically every branch of industry activity was limited only by the capacity of plant. During the preceding two years the trade conditions were of a highly favorable character, but satisfactory as these were, they were surpassed by those which prevailed throughout the year just closed, and it may be safe to assume that 1913 marks the highest level of prosperity to which the trade of Great Britain has yet attained. It would be ungrateful to quarrel with the result of the year's working, but in certain branches of industry the progress made would have been even greater had it not been, paradoxical as it may seem, checked by its own prosperity. Labor trouble in the sense of actual strikes loomed less large than it did in 1912, but many employers had to contend with a difficulty scarcely less demoralizing than strikes and infinitely more troublesome to remedy—that of broken time.

While the various industrial centres were employed to their full capacity, the measure of activity is not reflected altogether in profits. Consideration has to be given to the increased costs of working, particularly with regard to material, labor, and the higher rates ruling for money employed in the financing of industrial enterprise. Even when allowance is made for these, the net result of the year's work can scarcely be other than gratifying to the great majority of those engaged in commerce and industry. While the year, taken as a whole, was profitable, it has been apparent during the latter two months that the crest of the wave of prosperity has been surmounted, and that the demand is less urgent now than it was. The reductions in the price of material which were made recently are probably the best indication of the trend of affairs, but notwithstanding the falling off, the industries of the country are still enjoying a measure of activity which we would be glad to believe could be maintained throughout the present year.



NEW ALLAN LINE STEAMSHIP "ALSATIAN."

In the Shipyards.

Coming to particular trades, it will be noted from the statistics and comments in later pages that the great industry which looks to the Clyde, not only as its birthplace, but as the principal centre of its activity, had a remarkably successful year. The success was more marked on the Clyde than anywhere else, but it was quite apparent in other British districts and in every country which is attempting to encourage shipbuilding in legitimate ways, and where financial conditions did not handicap the industry in its competition for new work. There was never any doubt as to the genuine nature of the many demands for new tonnage, or as to the ability of the shipbuilding and marine engineering firms to supply that demand, and it was not until there came a falling off in the freight market that owners and builders became less active in their negotiations regarding orders for new ships. With that falling off a reduction in the volume of work on hand in the yards was anticipated, but sufficient time has not yet passed to allow freights to affect seriously the activity of the many firms engaged in turning out new ships.

The amount of tonnage on the order books of the builders must have been very much larger a year ago than any single individual was aware of, as although there was a decided and prolonged reduction in the number of orders reported from time to time, there is, even yet, practically no reduction in the amount of tonnage actually on hand. Builders are still engaged in working off orders placed during the fag end of the boom, orders for first-class liners for companies whose requirements do not always depend on the general trade or the freight market, as that term is usually understood, and for warships for home and foreign navies.

Costs of production have, however, never been higher than they are now, and we need not doubt the words of shipbuilders in the least when they say that profits are far lower than they were when far less money was passing through their hands. Many of the Companies which depend on shipbuilding pure and simple paid very small dividends—some of them none at all—even when they had to their credit large records of new work, but those which combine steelmaking and armor plate manufacture with shipbuilding and engineering have made money, and their prosperity has been credited by the unthinking to shipbuilding because they are known best to the public as shipbuilders. This has been one of the misleading features of the industry for some years back.

THE HAMBURG-AMERICA LINER "IMPERATOR."

The Engineering Shops.

In the engineering shops, the problems faced were less economic than mechanical. Marine engineering in particular is passing through a very obvious period of change, and the best authorities will not venture to predict the result. So far, the steam engine, in one form or another, has held its own against all competitors, and those who prophesied its gradual displacement by the internal combustion motor have seen reason to moderate their opinions. For most services, the modern reciprocating steam engine is more economical than the oil engine, so long as oil remains as expensive and as difficult to obtain at all ports as it is at present, while it has been proved that the turbine can be adapted by means of gearing to all services, and that, therefore, the oil engine must displace it, too, before it can be adopted anything like generally.

With oil fuel and geared turbines there seems to be still a great future for the steam engine; but engineering progress is so rapid nowadays that no one can tell whether it is to hold the field or be superseded by the direct-driving oil engine or the oil engine driving through electric, hydraulic, or other gearing. Marked progress is being made in all these directions, and in addition the combination of turbines and reciprocating engines is being used with the greatest success in the largest types of Atlantic liners. There has never been a more interesting period in the history of marine engineering than that through which it is now passing, or one of which it was more difficult to predict the ultimate development.

Prospects.

Taken all over, the year may be regarded with satisfaction, but the prospects are far from being so bright as they were twelve months ago. The trade "boom," which has lasted for about three years, is showing marked evidence

of having spent itself, and, while it is impossible to prophesy, there is every prospect of a reaction. For some months manufacturers have experienced a falling off in the demand for their wares, the extent of which is best indicated by the reductions which have taken place in prices.

undertake to give delivery of tramp tonnage before the autumn of 1914, and bridge builders and constructional works have well filled order books.

While it is true, however, that the trade outlook is not all that might be desired, the prospects for the coming year are not so doleful as they are reported

producing country remains unchallenged, and—subordinate to this—that the Clyde remains easily the first and greatest of all shipbuilding and marine engineering districts. Despite all the progress which has been made in other lands, despite the obvious fact that other countries are now building as well and sometimes al-

THE AUXILIARY SAILING SHIP "FRANCE."

The change has been most marked in the steel and iron trades. Steel makers' books have become somewhat depleted, and notwithstanding the lower prices buyers are showing little disposition to book ahead. Pig iron makers also report a falling-off in trade, and many of the furnaces have been put out of blast, makers deeming a restriction of output necessary so long as costs remain so high and no apparent outlet for the iron. Shipbuilders, on the other hand, are well employed, and in some cases cannot

to be in many quarters. Certainly new business is scarce, but in many branches of industry orders already placed will carry manufacturers well into the new year, while the lower level may bring out trade which in 1913 was retarded by the high prices which ruled.

Supremacy of British Shipbuilding.

If there is one lesson more than another which can be learned from the reports of shipbuilding work done in 1913 all over the world, it is that the leading position of Great Britain as a tonnage-

most as expeditiously as Great Britain, and are endeavoring more and more to supply their own requirements, if not to do a little more, and despite too the admittedly harassing labor conditions which have to be faced in British yards, the country maintains its lead and its shipbuilders continue to provide about their old-time proportion of the total tonnage required for the world's trade.

In 1913 there was no retrogression. The vessels chronicled in the returns show a total in number of 3,936, and in

LAUNCH OF THE CUNARD LINER "AQUITANIA."

measurement of 4,267,166 tons, while there is recorded the remarkable total of 4,924,799 i.h.p. In all of these figures there are increases as compared with 1912—in number of vessels 325, in measurement nearly 500,000 tons, and in machinery over 677,000 i.h.p.

The figures for the United Kingdom make up a very large proportion of the totals, even granting that numbers of small "unmeasured" vessels were built abroad, especially in Holland, of which we have no account, and that our home returns are absolutely complete. In the United Kingdom there were launched 1,474 vessels of 2,263,933 tons, and there were manufactured marine engines of 2,661,260 i.h.p. These figures show increases over those of 1912 of 120 vessels, 183,762 tons and 388,994 i.h.p. Of these increases, the credit for the additional number of vessels is due wholly to England, and that for the increased tonnage and horse-power principally to Scotland. England produced 133 vessels, 95,071 tons and 135,460 i.h.p. more than in 1912, while Scotland produced 15 fewer vessels, but 121,523 tons and 233,485 i.h.p. more, while Ireland turned out 2 vessels more, 32,832 tons less and 20,050 i.h.p. more than in the previous year.

Comparing the work of the United Kingdom with that of other nations—leaving British Dominions out of the reckoning, as not being "foreign" countries—we find that the United Kingdom produced just about one-third of the total number of vessels, nearly 320,000 tons measurement more than all other countries combined, and nearly 420,000 horse-power more. The apparent discrepancy in the lower number of vessels is explained of course by the fact that the vessels built in the United Kingdom are of much greater average size than those built abroad, and even allowing for whatever foreign work may be unrecorded, the margin of tonnage and horse-power in favor of the United Kingdom is so large that the supremacy of British shipbuilding is unquestionable. The following table puts the shipbuilding work of the world for the years 1913 and 1912 in the shortest possible space:

	1913.			1912.		
	Vessels.	Tons.	I.H.P.	Vessels.	Tons.	I.H.P.
England	945	1,322,306	1,399,445	812	1,227,235	1,263,986
Scotland	505	809,711	1,148,225	520	688,188	914,740
Ireland	24	131,916	113,590	22	164,748	93,540
U.K. totals	1474	2,263,933	2,661,260	1364	2,080,171	2,272,266
Dominions	280	59,025	20,662	208	36,578	17,922
Foreign	2182	1,944,158	2,242,877	2049	1,648,310	1,957,606
Grand totals	3936	4,267,116	4,924,799	3611	3,765,059	4,247,794

Leading Builders.

The old, old trouble about tonnage measurement renders it more than usually difficult to "place" the leading firms for 1913. On the strength of their "with erections" measurement of 107,636 tons, Messrs. Swan, Hunter and Wigham Richardson would be an easy first, but when the work of all the firms is reckoned by Board of Trade tonnages for merchant ships and displacement for warships, it is found that the highest total for the year is to the credit of another Tyne firm—Armstrong, Whitworth & Co. It is all a question of methods of measurement of course, and the Elswick concern have the highest total, principally because they launched two battleships, the tonnage of which is displacement, while the big yards at Wellsend and Walker have the displacement of only two destroyers, and the measurement of one caisson, apart from their Board of Trade tonnage.

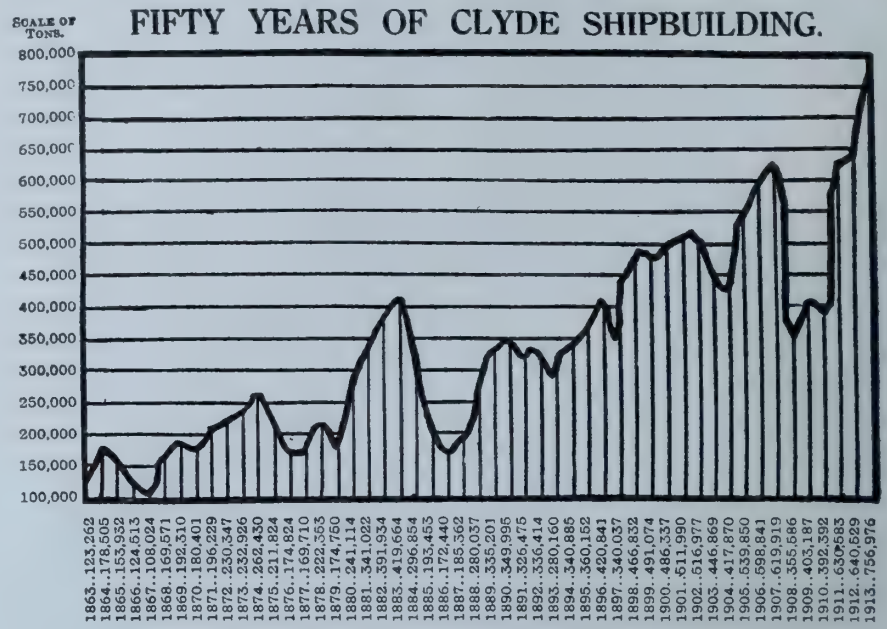
If all the work of both firms were reckoned either as Board of Trade tons or as displacement, the Wallsend firm would have the highest total, but so long as official methods of estimating tonnage remain as at present they must be allowed to rule, and cubic measurement and actual weight must be added up together—absurd though this would be in any other line of business. It should also be frankly admitted that the work not recognized by Board of Trade regulations is as much real shipbuilding as that which is so recognized, and that in ruling it out for comparison purposes we deduct real tonnage from a firm's record of work.

Exactly similar deductions apply to all firms, however, so that if there be any reason for complaint, the charge must be made against the measurement laws of the country and not against those who base their calculations on the results of these laws. On the basis of official measurements, then, the order of the first half dozen firms in the matter of tonnage is as follows:—

	Vessels.	Tons.
Armstrong, Whitworth & Co.	9	99,333
Swan, Hunter & Wigham Richardson	22	97,335
Blohm & Voss	8	96,850
William Gray & Co.	18	85,298
The Vulcan Co.	14	85,213
Workman, Clark & Co.	11	84,217

The following are the firms which have had the largest tonnages in the world since 1890:—

Year.	Company.	Tons.
1913.	Armstrong, Whitworth & Co.	99,333
1912.	Swan, Hunter & Wigham Richardson	121,281
1911.	Harland & Wolff	118,209
1910.	Harland & Wolff	115,861
1909.	Workman, Clark & Co.	88,952
1908.	Harland & Wolff	106,528
1907.	American Co. (7 yards)	191,602
1907.	William Doxford & Sons	91,254
1906.	American Co. (6 yards)	193,535
1906.	Swan, Hunter & Wigham Richardson	117,943
1905.	American Co. (7 yards)	136,793
1905.	William Doxford & Sons	86,632
1904.	Russell & Co.	73,689
1903.	American Co. (7 yards)	166,288
1903.	Harland & Wolff	110,463
1902.	American Co. (7 yards)	132,197
1902.	Harland & Wolff	79,497
1901.	Harland & Wolff	92,310
1900.	William Gray & Co.	74,191
1899.	Harland & Wolff	82,634
1898.	William Gray & Co.	72,323
1897.	Harland & Wolff	82,240
1896.	Harland & Wolff	81,310
1895.	William Gray & Co.	66,086
1894.	Harland & Wolff	65,448
1893.	Harland & Wolff	65,660
1892.	Harland & Wolff	68,612
1891.	Harland & Wolff	64,962
1890—	Russell & Co.	70,370



FLUCTUATIONS OF CLYDE SHIPBUILDING SINCE 1863.

Leading Engineers.

A very large proportion of the total of 1,111,440 i.h.p. produced by Clyde engineers came from the works of two firms—John Brown & Co., of Clydebank, and the Fairfield Shipbuilding & Engineering Co., of Glasgow. Together, these firms manufactured marine engines—mostly turbines—of 451,200 i.h.p.—more than a third of that of the whole river. The Clydebank work makes a total not only the highest in the world this year but the highest ever produced by one firm, and it, like that of the Fairfield Co., and that of Schichau, of Danzig and Elbing, represents very largely machinery for war vessels. In 1912 John Brown & Co., had the highest horsepower in the world, and the Danzig firm the second highest. The following is the order of the first half dozen engineering Companies:—

	I.H.P.
John Brown & Co.	239,000
F. Schichau	212,800
The Fairfield Co.	202,300
Blohm & Voss	161,000
The Wallsend Slipway Co.	159,550
The Danubius Co.	152,000

the Clyde, all the districts have been busy, and there are increased tonnages from all the areas. The Clyde increase consists of 116,447 tons. The increases in the other three districts are small, but as the total work done is relatively small they are equally satisfactory. The Forth yards did practically the same amount of work as in 1912; so did those of the Tay, but the Aberdeen and Moray Firth firms increased their output by nearly 4,000 tons. All over there was a decrease in vessels from 520 to 505, but an increase in measurement from 688,188 tons to 809,711 tons, and in horsepower from 914,740 to 1,150,425. These figures show a gain in tonnage of 121,523 and in horse-power of 235,685. The following table shows the work done by Scottish builders during 1913 and 1912:

	1913.			1912.		
	Vessel.	Tons.	I.H.P.	Vessel.	Tons.	I.H.P.
The Clyde	370	756,976	1,111,440	389	640,529	878,325
The Forth	23	19,519	7,355	32	19,054	7,915
The Tay	10	18,157	6,225	28	17,388	10,400
The Dee	102	15,059	23,205	71	11,217	18,100
	505	809,711	1,148,225	520	688,188	914,740

The Clyde Output.

There is so much that is notable in the record of the work done on the Clyde during 1913 that it is only possible to refer to a few of its more outstanding features. First of all, there is the great volume of the tonnage launched. Never before has there been anything like 756,000 tons of new shipping launched on the river within twelve months, although this is stating the fact very baldly. Its significance as a stage in the industrial story of the district will be more vividly realized by a glance at the accompanying diagram.

From the accompanying table it will be seen that the total output of the district was over 600,000 tons for the first time so recently as 1907, that it made the half million only so far back as 1901, and that we require to look no farther back than 1898 to find that the record tonnage was over 400,000 for the first time. Even the first 300,000 is easily within the memory of still active shipbuilders, for it was achieved in 1881, and then the figures were abnormal, for it was not until after 1889 that the figures over 300,000 became quite ordinary; so that, within a period of less than a generation, the normal production of the Clyde has been doubled. Even granting that the tonnage of 1913 is abnormal, there is a sufficient margin to justify this statement.

The Crest of the Wave.

It seems evident, however, that the industry is now on the crest of the wave of activity, or—to use a phrase borrowed from labor negotiations—there are indications that the apex of prosperity has been reached. Another reference to the diagram will show that there has been since the close of 1910 the most remarkable advance in the history of the river. Within these three years, the tonnage has been almost doubled, although it must be noted of course that 1910 was a very poor year indeed, and that in comparing it with 1913 we are comparing extremes; for 1913 was as much at the extreme of activity as 1910 was at the extreme of dullness.

All through the twelve months there was more work to be done than could be done. The employers were anxious to get ships forward to the launching and delivery stages, but they were handicapped on every hand by the fact that certain sections of their men were working much less than full time. Labor was the great irritating factor in the situation, and but for delays caused by the irregularities of labor the tonnage for the year would have been even larger—considerably larger, in fact.

Principally owing to these irregularities costs were and still are very high, so that the margin of profit is, in many cases, very small. Several Clyde builders complained publicly and emphatically about the way in which the time of their works was being wasted, and appealed to the ironworkers to put in a more regular week, but, it is feared, with little effect. Continually increasing costs, therefore, make the greatest and most difficult problem which the firms now have to face.

Improving the Yards.

With all the activity which has prevailed, and with the accompanying impression that there was bound to come a falling-off in trade at an early date, there was a certain striving after improvements in works, in plant, and in organization which indicated plainly that the firms concerned had an unlimited amount of faith in the future of their industry. Harland and Wolff have developed their Govan yard immensely, and have extended their works along the riverside and to a new site a short distance from the river. Thanks to negotiations which were concluded before Govan was joined to Glasgow, they have unrestricted access to the river front.

The Fairfield Company and Alex. Stephen & Sons are hoping to obtain similar freedom of access, but the pro-

Leading Vessels.

The "vessels of the year" were undoubtedly the huge Hamburg-Amerika liner Vaterland, built at Hamburg, and the almost equally huge Cunard liner Aquitania, built at Clydebank. The Vaterland is of 56,000 tons, and is a few thousand tons larger than her sister ship The Imperator, so that she is the largest vessel in the world. The Aquitania—of 47,000 tons—is the largest owned in Great Britain, and the next largest in the world after the two German boats. After the Aquitania there comes the 35,000-ton Norddeutscher Lloyd liner Columbus, built at Danzig, and after this vessel the Hamburg-Amerika liner Tirpitz, of 21,000 tons, built at Stettin. The Clyde-built Allan liners Alsatian and Calgarian—each of 18,500 tons—make the fifth item in the group, and the Hamburg-Amerika liner Cap Trafalgar, of 18,000 tons, built at Hamburg, completes the half dozen—seven vessels really of course. It may be added that although the Vulcan Company have themselves returned the Cap Trafalgar as of 18,000 tons, she has since then been officially referred to as of 18,700 tons, so that it is possible that she should be reckoned as larger than the twin Allan liners. In that case four of the largest half dozen vessels launched in 1913 will have been German built.

Vessel and Type.	Builders.	Tons.
Vaterland—4 screw turbine	Blohm & Voss	56,000
Aquitania—4 screw turbine	John Brown & Co.	47,000
Columbus—twin screw	F. Schichau	35,000
Tirpitz—twin screw turbine	The Vulcan Co.	21,000
Alsatian—4 screw turbine	Wm. Beardmore & Co.	18,500
Calgarian—4 screw turbine	The Fairfield Co.	18,500
Cap Trafalgar—3 screw, recipro. and turbine	The Vulcan Co.	18,000

Scottish Shipyards.

Although the great preponderance of Scottish ship-building work is done on

posals of the Glasgow Corporation in that direction have yet to obtain Parliamentary approval. At Scotstoun Barclay, Curle & Co., now have their "West Yard" in full operation, and the first vessels built there was launched in December. At Port-Glasgow, Russell & Co. have completed a fine new fitting-out basin, and Dunlop, Bremner & Co. have improved their wharf at the same place, so that both firms can berth their new vessels within their own private waters.

There are indications that at least another firm have plans beside them for a new basin, while plant is being renewed and brought up-to-date in practically all the yards. It follows, therefore, that while the work of 1913 represents the highest tonnage and the highest money value ever credited to the district, the capabilities of the river are by no means exhausted. So far as the yards and the firms and the men—in the matter of ability at least—are concerned, much more work can be done quite easily.

Nature of the Work.

Among the 370 vessels of 756,976 tons which were launched, only one notable class is unrepresented There is no motor vessel of the size and type which can be properly designated a "motor-ship." In 1912 there was the Canadian Lake vessel Fordonian at Port-Glasgow, and in 1911 there was the East Asiatic Co. of Copenhagen's Jutlandia at Whiteinch. The fact that there was no launch of a vessel of this type on the river in 1913 has no special significance, as there are several being built at Harland & Wolff's yard, and several of the leading firms are constructing, or preparing to construct, large oil engines for marine purposes.

Of vessels propelled by geared turbines—the rivals which threaten most strongly to block the way of the oil engine—three were launched, while the direct coupled turbine in its most modern form will be found in several of the important vessels of the Clyde year. The following table gives a rough allocation of the tonnage to the different types of ships:—

Type.	Number.	Tons.
Screw steamers	121	538,841
Turbine steamers	3	83,000
Geared turbines	3	3,080
War vessels	17	64,617
Barges, lighters and pontoons	67	18,496
"Combination" steamer	1	15,690
Paddle steamers	14	13,351
Dredgers	22	11,976
Steam tugs	23	2,955
Hopper steamers	2	1,600
Motor vessels	76	1,533
Dock gate	1	920
Rockcutters	3	438
Sternwheel steamers	4	389
Sailing yachts	12	172
Steam launch	1	10
	370	756,976

To the Clyde-built warships another article is devoted, and reference has already been made to the three large liners—the Aquitania, the Alsatian, and the Calgarian. Other notable "vessels of the year" were the Dutch liners Gelria and Tubantia at Linthouse—ships which marked a distinct development not only in Dutch shipping, but in naval architecture—the four P. and O. steamers at Greenock, the two Union-Castle liners at Fairfield and Whiteinch, the two Canadian Cunard liners at Greenock, and the triple-screw "combination" Royal Mail liner Alcantara at Govan. In amount of gross tonnage launched, Russell & Co., of Port-Glasgow, again lead with 16 vessels of 83,876 tons, but they are followed closely by John Brown & Co. with a warship and liner tonnage, amounting to five vessels of 82,722 tons.

Clyde Engineering.

In marine engineering even more than in shipbuilding—and that is saying a good deal—the Clyde has led the world, and never more so than in 1913, for not only has it the highest horse-power which has ever been turned out by one firm in one year, but it has also the third highest in the world for that year. The remarkable figures, which appear in the returns of John Brown & Co. and the Fairfield Shipbuilding and Engineering Co., 239,000 i.h.p. and 202,200 i.h.p. respectively, are vivid illustrations of the increasing power and speed of ships—particularly of warships.

In each case the bulk of the machinery was for war vessels for Great Britain and other countries, and in each case, too, the firm's engineering department did much more work relatively than its shipyard—that is, a certain proportion of the horse-power was for vessels built elsewhere. In the Clydebank works, turbines were constructed for the big Cunard liner Aquitania, the big battle cruiser Tiger, and the destroyer Ambuscade, and also twin-screw reciprocating engines for the Russian passenger steamers Emperor Peter the Great and Emperor Nicolai I.

All these vessels were built at Clydebank, but, in addition, the firm supplied turbines for the Russian battleship Empress Maria, built at Nicolaieff, and the Chilian battleship Almirante Latorre, built at Elswick. What the individual horse-powers of the different vessels are is not stated officially, but the proportion of reciprocating engines to turbines is remarkably small. This remark applies also to the engineering work of the Fairfield Co.

In this work there is included the reciprocating engines for the Union-Castle liner Llanstephan Castle, and the turbines for four destroyers and the big Allan liner Calgarian—all ships built in the same works—and also the turbines for the British dockyard-built cruisers Lowestoft and Arethusa, the whole making up a total very little short of that of Clydebank, and easily the third in the world. Messrs. Yarrow & Co., too, had a large proportion of turbine machinery, and the high total of 86,580 i.h.p. They built and engined three British destroyers and one Portuguese destroyer.

Denny & Co.'s proportion of turbine work was not so large relatively, as they engined only one destroyer and two merchant vessels, but one of the merchant vessels—the Paris—was of special interest, because she has Parsons helical gearing between the turbines and the propellers. Other large turbine installations were made by Messrs. Beardmore—who made no reciprocating engines whatever—and A. & J. Inglis, who built and engined the geared turbine steamers Elgin and Hardinge for Indian railway service.

Oil Engine Feature.

There are no oil engines for large ocean-going ships in the Clyde marine engineering returns for 1913. Last year there were those of the Port-Glasgow-built Canadian Lake cargo vessel Fordonian; and in 1911 there were those of the Whiteinch-built Danish passenger vessel Jutlandia. There are in the work of 1913, however, crude oil engines of 975 b.h.p. constructed at Dalmuir by William Beardmore & Co. for three new Glasgow coasters—two of 230 h.p. each and one of 130—and for a vessel of 45 h.p. built at Plymouth, one of 120 h.p. and one of 60 h.p., both built in New Zealand, and two of 80 h.p., both built at Southampton.

In addition, Yarrow & Co. supplied for the Portuguese patrol boat Republica, built by themselves, a semi-Diesel engine of 80 h.p., and the Bergius Launch and Engine Co. constructed motors of 12,713 h.p. largely for commercial vessels. The Burmeister & Wain (Diesel System) Oil Engine Co. have now completed the alterations at their Glasgow works, and during 1914 they will be manufacturing oil engines of large size for ocean-going ships, while there will also be records of machinery of this type made at Fairfield, Greenock, and elsewhere.

The Clyde Outlook.

About the Clyde shipbuilding prospects it can only be said that everything depends on two factors—the condition of the freight market and the relations of employers and men. That there is still a large amount of work on hand is obvious to anyone who sails down the river. The yards are about as busy as they were all through 1913. There may not be so much work on the books of the respective firms as there was a year ago, but even that is a moot point, as the work actually on order is always an unknown quantity.

It was an unknown quantity a year ago, as a comparison of the "prospects"

then and the tonnage launched in the twelve months shows. In any case 1914 is making an exceedingly good start so far as work on hand is concerned, and, if the freight markets do not fulfil the very pessimistic anticipations of some shipowners, there should be sufficient new contracts coming to fill up the blanks on the berths which become vacant. As to labor troubles, there is always the danger of these. Wages will probably require to be again adjusted, and there are many local and national questions that may give rise to differences of opinion between employers and men, and may possibly disorganize work in the yards.

English Shipyards.

While a general advance is shown by the figures relating to England as a whole there are interesting variations in the different districts. There is an increase on the Tyne—in number of vessels, in tonnage, and in horse-power. On the Tees, there are fewer vessels, but the tonnage increase is greater, while the horse-power provides figures not very different from those of the previous year. On the Wear fewer vessels were launched, and the tonnage is lower, but the horse-power is higher. On the Mersey, there are decreases in tonnage and horse-power, even with more vessels. The Humber shows increased tonnage, but decreased horse-power, the Thames an all-round increase, the English Channel increases in tonnage and horse-power, and the Bristol Channel very little change. All over 945 vessels of 1,322,306 tons and 1,399,445 i.h.p. were launched, as compared with 812 vessels of 1,227,235 tons and 1,263,986 i.h.p. in 1912. These figures show increases of 133 vessels, 95,071 tons, and 135.459 i.h.p. The following table shows the two years' work of all the English districts:—

	1913.			1912.		
	Vessel.	Tons.	I.H.P.	Vessel.	Tons.	I.H.P.
The Tyne	106	428,092	522,482	97	388,376	464,855
Tees, Hartlepools	95	307,496	187,428	100	261,888	182,210
The Wear	79	303,108	198,225	82	309,934	191,806
Mersey-Solway	168	112,740	215,175	128	139,601	243,480
Humber	106	62,073	60,957	112	43,340	62,970
The Thames	214	18,874	23,095	120	14,319	16,860
English Channel	128	12,503	191,362	130	11,931	101,635
Bristol Channel	38	6,320	721	39	3,761	170
Dockyards	11	80,600	.....	4	54,085	.....
	945	1,322,306	1,399,445	812	1,227,235	1,263,986

The Tyne.

The important Tyne district has been very busy, and has done some very valuable and very interesting work. Its output consisted of 106 vessels of 482,592 tons and machinery of 522,482 i.h.p. There were increases as compared with the previous year of nine vessels, over 40,000 tons, and over 57,000 i.h.p. The increase was most marked in the case of Armstrong, Whitworth & Co.; indeed, their figures more than explain all the advance in tonnage, and their large output is accounted for by the fact that they launched two battleships for Brazil and Chili respectively.

On their "with erections" tonnage of 107,636, Swan, Hunter & Wigham Richardson would have the highest output, not only on the Tyne but in the world; but as it would not be fair to use this measurement in comparison with Board of Trade tons, the Elswick firm must be reckoned as leading for the year in the matter of tonnge. In both cases a large proportion of the work consisted of oil tank steamers. Of Swan, Hunter & Wigham Richardson's 22 vessels, exactly one-half were steamers for carrying oil in bulk, and are British-owned, while one of their vessels is an oil-engined ship of 3,550 tons, for which the firm are supplying twin-screw Neptune-Diesel motors.

In the work of the other firms there will also be found a good many oil tank steamers. This class of vessel has done a great deal to keep the North-East Coast busy, and promises to keep it busy for some time longer. In horse-power Hawthorn, Leslie and the Wallsend Slipway Co. are responsible for the increase. There is a large amount of work in hand, and trade prospects are good.

The Wear.

The summary of the Wear figures bears a striking resemblance to that of the previous year, there being very little difference either in tonnage or horse-power. There are variations in the individual returns, but the figures show that the district has been uniformly busy. It is still busy, and promises to be for some time to come. All its work has consisted of cargo steamers, several of them on the New Monitor and Arch principles.

Tees and Hartlepools.

The Tees and Hartlepools district was busier, and almost all its yards show increased tonnages. Its total of 307,496 tons is better by some 45,000 tons than that of 1912. In its case, too, the vessels were nearly all cargo carriers, but there was at least one of special interest—the Diesel-engined Tynemount, in which electrical transmission of power is installed. Immediate prospects are good.

The Humber.

In the Humber district the usual large number of fishing craft were launched, and the year's work shows no features of outstanding interest. There is work on the sticks at most of the yards for well down through 1914.

Mersey to Solway.

Owing to the decrease at Birkenhead, the Mersey-Solway total shows a considerable falling off, but the firms have all work enough to be going on with.

Thames and District.

The Thames firms are specializing in small craft very largely, and there is the large total of 214 vessels to their credit.

The Bristol Channel.

The Bristol Channel yards nearly doubled their 1912 tonnage, turning out quite a number of vessels.

The English Channel.

The feature of the English Channel work is the large amount of machinery turned out by Messrs. Thorneycroft at Southampton, their total of 110,300 i.h.p. being greater than that of the whole district in the previous year. It includes the machinery for four destroyers built at their own yard. J. Samuel White & Co., of Cowes, have also a large destroyer horse-power, having built and engined three such vessels.

Irish Shipyards.

Belfast is not by way of having any records for 1913, and but for their Glasgow yard, Harland & Wolff would have had their smallest tonnage for many years, and even with the work of that, they are not inside the world's first half-dozen for the year. Workman, Clark & Co. are, however, and in 1914, when the Britannic and other large vessels are to be launched, the Queen's Island yard will probably resume something like its usual place. Both the firms are very busy, and will likely remain very busy for at least another year. At Londonderry, the North of Ireland Shipbuilding Co. have made a good start by launching two steamers.

British Dominions.

..The firms in Eastern Canada are doing an increasing amount of work, and three of them turned out considerably more tonnage than 1912. If, as is reported, Messrs. Yarrow, of Glasgow, are to start a new yard on the British Columbia coast, a revival may be expected in that district also. Canada,

	1913.			1912.	
	Vessels.	Tons.	I.H.P.	Tons.	I.H.P.
Western Drydock & Shipbuilding Co.	6	15,898	.....	6,694	.....
The Collingwood Shipbuilding Co.	4	9,982	4,500	4,607	4,300
Burn & Co.	62	7,778	3,528	7,098	2,320
John King & Co.	58	5,687	254	5,970	150
The Taikoo Company	7	5,513	3,600	.....	.....
Hong Kong and Whampoa	10	3,304	4,580	1,392	.....
Polson Shipyard	3	2,063	950	466	775
D'k Board, Singapore	23	942	605	.....	.....
United Engineers	14	514	85	491	275
Other firms	93	7,344	2,560	9,860	10,102
	280	59,025	20,662	36,578	17,922

indeed, judging from the number of British firms which are operating or organizing shipyards there, promises to be an important shipbuilding district in the near future.

British Dockyards.

The output of the United Kingdom's Royal Naval Establishments was 11 vessels of 80,600 tons displacement. In 1912 it was four vessels of 54,085 tons; in 1911 seven vessels of 59,260 tons; in 1910 four vessels of 52,521 tons; in 1909, six vessels of 46,612 tons; and in 1908, five vessels of 43,080 tons.

The contractors for the Queen Elizabeth's turbine propelling machinery are the Wallsend Slipway & Engineering Co.; for the Warspite's and the Nottingham's, Hawthorn, Leslie & Co., Newcastle; for the Lowestoft's and the Arethusa's, the Fairfield Shipbuilding & Engineering Co, Govan; and for the Aurora's, the Parsons Marine Steam Turbine Co., Wallsend. The Carol is a steamer, but the Trefoil will have Vickers-Diesel oil engines.

Foreign Shipyards.

In only three of the shipbuilding countries do the figures show a decrease in tonnage. Of these the United States is easily the most important. The production — of practically the same list of firms — has fallen from about 322,000 tons to about 266,000 tons—a decrease of about 56,000 tons. It is not much, perhaps, but it is enough, coupled with the activity in the Netherlands, to remove the United States from second position among foreign countries and give the place to Holland. The other decreases were in Norway, Austria-Hungary, and China, and in each they represent only ordinary fluctuations of trade.

Of the other countries, Germany has advanced from 530,000 tons to 646,000; Holland from 258,000 to 268,000; France from 178,000 to 264,000; Japan from 90,000 to 125,000; Denmark from 27,600 to 43,700; Italy from 35,600 to 89,700; Russia from 3,600 to 40,800 (explained principally by a battleship launch); Spain from 20,300 to 24,400; Sweden from 12,300 to 22,000, and Belgium from 21,300 to 22,000. These figures compare poorly of course with those of Great Britain—even with those of the Clyde alone—but the industry is steadily becoming more International in character, and although there is no no single district, or even country, that can compare with the Clyde, activity is becoming more general every year, and the yards in every country are becoming more capable of doing all kinds of work.

The United States.

The prospects of a revival of the shipbuilding industry in America as a result of the tariff changes are being widely discussed, and it may be pointed out that there is considerable room for "encouragement" of some kind, either in the way of assistance or of liberty—if the industry is to hold its own with shipbuilding in other parts of the world. A total less than that of Holland, and with returns probably more complete than those of that country, is scarcely creditable to the United States.

The industry flourished for years on the Great Lakes even when it languished on the seaboard, but now it seems to have received a set-back also in that district, and the American Company report only from two yards and give a total the double of which would not give them anything like a place among the world's first half-dozen. The opening of the Panama Canal is certain to give an impetus—for a time at least—to American shipbuilding as well as shipping, but unless economic conditions are improved and costs of construction reduced, it is difficult to see how the yards can possibly obtain other than home orders.

	1913.			1912.		
	Vessels.	Tons.	I.H.P.	Tons.	I.H.P.	
Germany	417	645,953	776,171	408	530,312	646,025
Holland	762	267,715	116,653	705	258,263	112,859
United States	216	265,589	265,385	196	321,592	324,208
France	146	263,928	287,216	112	177,883	254,595
Japan	212	124,624	202,984	272	89,925	180,851
Norway	72	50,071	41,318	100	53,256	58,273
Denmark	38	43,691	24,717	37	27,622	18,605
Italy	66	89,671	223,390	62	35,617	201,865
Austria-Hungary	66	75,021	171,450	22	83,192	89,910
Russia	43	40,814	59,682	23	3,604	4,510
Spain	14	24,443	40,500	10	20,372	37,750
Sweden	40	22,080	21,181	21	12,286	10,680
Belgium	30	22,071	10,000	18	21,329	9,215
China	60	8,487	2,230	63	13,057	8,260
	2,182	1,944,158	2,242,877	2,049	1,648,310	1,957,606

Among the vessels in course of construction are ten torpedo boats and two large mail steamers at Cramp's yards, Philadelphia; the battleship Nevada, and several large freighters at Quincy; five vessels of from 2,650 to 4,900 tons at the Great Lakes Works; two large freighters at Baltimore, and five at Newport News—as well as the big battleship Pennsylvania and the battleship Texas completing; the battleship Oklahama, several destroyers, and a number of other vessels at Camden, N.J.

	1913.			1912.	
	Vessels.	Tons.	I.H.P.	Tons.	I.H.P.
Dockyard Warships	3	465	1,750	46,360	35,200
Newport News Co.	8	53,238	27,850	61,242	62,100
New York S.B. Co.	10	35,391	33,500	34,123	39,550
Maryland Steel Co.	8	32,442	21,000	36,680	24,000
American S.B. Co.	6	25,485	18,000	38,015	25,460
W. Cramp & Sons Co.	15	24,947	41,000	10,737	31,400
Harlan & Holl'gwth	8	12,857	15,060	9,191	9,100
Great Lakes Works	12	11,288	6,660	18,603	10,100
American Car Co.	17	10,400	....	11,232	....
R. Palmer & Son	9	6,884	....	1,926	....
Craig Shipbuilding Co.	3	6,848	....	3,900	4,100
Fore River Company	11	6,811	18,650	12,780	18,900
The Seattle Company	9	4,602	8,070	3,424	4,510
Manitowoc Shipbuilding Co.	6	3,842	1,150	4,807	....
Union Iron Works	29	3,500	....	....	....
The Perth Amboy Co.	4	3,808	2,625	1,870	1,250
Staten Island Co.	9	3,482	6,000	2,875	2,100
T. S. Marvel Co.	4	2,920	2,300	1,250	....
Bath Ironworks	3	2,346	35,275	1,484	24,000
Mathews S.B. Co.	2	1,700	....	818	500
G. G. Deering Co.	1	1,627	....	....	....
W. & A. Fletcher Co.	2	1,300	13,100	....	10,350
United Eng. Works	4	1,184	3,555	4,957	4,250
Moore & Scott	1	1,045	....	....	....
The Dubuque Works	2	1,000	....	500	600
Dialogue & Son	3	833	1,200	1,071	2,350
Other firms	21	5,344	8,640	13,747	14,388
	216	265,589	265,385	321,592	324,208

Germany.

Althought there were many reports of unsatisfactory financial conditions in Germany, a great deal of work was done, and even without the new dockyard warships the total would have been higher than that of 1912. The proportion of warship tonnage all over Germany was higher than usual, and so was that of large passenger liners. With the Vaterland, the Cap Trafalgar, the Tirpitz, the Columbus, and the Frederick VIII. all in one year, the German shipbuilding industry has a record of which it may well be proud. It is questionable, indeed, if even Great Britain has any years in which five vessels such as these were floated. In addition, there are oil-engined ships of 4,350, 5.703, 5,456, and 9,700 tons, as well as a number of smaller motor vessels for commercial purposes.

The Hamburg-America liner Tirpitz, of 21,600 tons—launched in December at Stettin—is to be propelled by turbines transmitting their power through Futtinger transformers. The smaller vessel, Koningen Luise, also built at Stettin, is to have the same type of machinery, so that the firms are not confining themselves to one or two of the new lines of development. Notwithstanding their undoubted enterprise, however, many of the German companies cannot be called prosperous in the financial sense of the term, and several of them have undergone reconstruction recently or have

changed hands. At the larger yards, there is a good supply of work on hand, but there is said to be a scarcity of orders at the smaller establishments which come less before the eye of the public.

Denmark.

The remarkable feature of Danish shipbuilding is the fact that for the first time the work of an important firm consists wholly of motor ships of large size. The Burmeister & Wain record is one of the most interesting of the year, as it shows not only the capabilities of their works, but the faith of their clients in the new propelling power. Other six motor vessels of fair size were launched from Danish yards, and the total was considerably larger than that of 1912. Among the work on hand are five motor ships and two steamers at Burmeister & Wain's yard; six steamers at the Copenhagen Company's; three steamers at the Elsinore Company's; a motor lighter at Marstal, and a small steamer at Aalborg.

France.

There has been a large increase in the French tonnage, owing principally to the launching of three battleships and five large passenger steamers. The liners are of exceptional interest, because three of them have recipro-turbine machinery. There is also a motor tanker of 4,000 tons at Rouen, and a motor ship of 303 tons at Havre, while at Cherbourg Dockyard the largest submarine in the world —the Gustav Zede—was launched in May, and the largest steamers ever built at Nantes—the Champlain and the Dupleix—are among the launches of the year.

Among the merchant work on the stocks are vessels representing 72,000 tons and 450,000 i.h.p. at Dunkirk—including two large twin-screw steamers almost ready for launching—a vessel of 18,000 tons at Bordeaux, two of 14,980 each, and three of 12,000 each at La Seyne, a four-screw turbine steamer of 16,000 tons and 22,000 i.h.p. at Port de Bouc, and a vessel of the same type, and of 37,500 tons displacement and 50,000 i.h.p. at the Atlantique Yard, St. Nazaire.

Holland.

Although we have returns from something like eighty Dutch shipyards and engine shops, that does not by any means exhaust the list belonging to the country. There are said to be altogether in Holland 194 shipyards, employing about 21,500 men, but the great majority of these construct only light river craft, of types that never appear in any official statistics. More than a dozen of the new vessels were for British owners—a fact which shows that there is something in foreign competition.

There were, as a matter of course, a large number of motor ships, from two 4,500-ton tankers at Amsterdam to small motor boats and barges. The great majority of these vessels are for cargo-carrying purposes, but there are several large cargo motor ships at Amsterdam and Rotterdam, there is a motor dredger at Zalt Bommell, seven motor tugs at Slikkerveer, a gas motor vessel at Alblasserdam, and a large motor schooner at Waterhuizen. The total tonnage is about the same as that of 1912, while the variety of the work done is even more marked.

Spain.

The Spanish dockyards have the respectable total of seven vessels of 16,725 tons and 40,500 i.h.p. to their credit for the year, and there are still on hand the battleship Jaime I. at Ferrol—where last year's battleship, the Espana, is fitting out—one destroyer at Cartagena, and also 16 torpedo boats. The Euskalduna Company are building a single deck steamer of 4,200 tons for home owners.

Sweden.

The Swedish output shows a considerable improvement on that of the previous year. Among the launches there were a small turbine steamer at Gothenburg, a destroyer at Malmo, and a motor ship each at two of the Gothenburg yards, the Gefle works and at Soderkoping, and three motor yachts at Hastholmen. The battleship Sverige is still on the stocks at the Gota works, and so are two large motor oil tankers for Russia.

Russia.

The first of the Nicolaieff battleships has been launched and figures in this year's returns. Some of the group of steamers to the credit of the Nevsky Works were launched late last year, while the name of the Warkaus firm figures in the returns for the first time.

Belgium.

Belgian shipbuilders have been and still are very busy. Their output includes two fine cross-channel turbine steamers, two twin-screws for the same service, and a number of motor yachts and launches.

Norway.

There is a reduction in the Norwegian output, but there is a large amount of work on hand, and prospects are very satisfactory. The new tonnage consists largely, as usual, of handy cargo steamers and whaling vessels. There is one motor ship among the launches—a vessel of 280 tons at Stavanger—but there are two vessels of this type—one of 2,200 tons and the other of 2,600 tons—on hand at the Akers Works, Christiania.

Italy.

The two dockyard-built battleships help to give Italy a much larger tonnage than in 1912, while these and a number of destroyers run up the horse-power considerably. Of naval work on order, there are a battleship each at the Ansaldo, Orlando, Odero (Sestri Ponente) yards and Spezia dockyard, four Turkish destroyers at the Orlando Works, and three motor tank vessels at the other yards for the home Government.

Of merchant tonnage, the Co-operative Works, Sampierdarena, have on hand eight tugs; the Escercizio Bacini, two large shelter deck steamers; the Cantieri Napoletani, two destroyers for Italy and four for Roumania; the Cantieri Navali Riuniti, a large cargo steamer and three smaller vessels; and the Societa Veneziania seventeen small ships of various types.

Austria-Hungary.

A large proportion of the tonnage launched at Austro-Hungarian yards consisted of warship work, and a still larger proportion of the machinery constructed. On hand there are at the Stabilimento Technico's works a number of good-sized passenger and cargo steamers, and several destroyers; at the Martinolich yard half-a-dozen small vessels, at the Cantiere San Roco five cargo boats of from 5,500 to 6,900 tons, and at the Cantiere Navale Triestino nine steamers of from 4,500 to 15,250 tons; also a cruiser and three scouts for the Chinese Government.

Japan.

As sister ships to the Kongo—launched at Barrow in 1912—and the Hiyei—at Yokosuka the same year—there were two battle cruisers under construction a year ago in private shipyards in Japan. One was at the Mitsu Bishi Works, Nagasaki, and the other at the Kawasaki Dockyard, Kobe. These have now been launched, and they help to swell greatly the tonnage of 1913. From the Imperial Dockyards only small vessels were launched, but at each of the Kure and Yokosuka establishments there is a battleship of over 30,000 tons under construction. Each of the private yards named has similar work. How many of these four sister ships will be launched during 1914 is probably not yet decided, but the Kure ship (the Fuso) was started first. Of the two battle cruisers launched this year, one has Parsons turbines and the other Curtis.

Among the merchant vesels launched and finished, there were three large steamers. Of these, one has the combination of reciprocating engines and turbines and one has geared turbines. Three other large vessels which were "on hand" a year ago have not yet been floated. These three are now given as of 12,000 tons, or a little less. In addition, there is a steamer of 10,000 tons, one of 9,500 tons and four of about 7,600 tons. Two of the 7,600-ton steamers are each to have geared turbines of 5,800 horse-power. In other respects than mere amount of work on hand, the

prospects are perhaps more satisfactory for the country than at any previous date.

Japan, as becomes her, is proceeding cautiously, but she can report progress. The total output for the year, it will be seen from the figures, shows a substantial increase on that of 1912. Although this is accounted for principally by the new war vessels, there has been considerable activity in the building of small craft throughout the country, especially on the Inland Sea. A large number of the vessels are for fishing purposes, and many of them are sailors. The numerical proportion of non-propelling craft built in Japan is larger than in any other country, but this proportion will decrease steadily as local engineering develops, and the returns from the fishing industry justify increased expenditure.

China.

A smaller aggregate tonnage was launched at the Shanghai shipyards than in 1912, but the establishments continue fairly busy with the construction of river steamers, lighters, tugs, and small craft generally. The New Engineering Works are building a river steamer, two tugs, two motor barges and two steel lighters; while the Shanghai Dock Co. have on hand a steam collier of 6,000 tons, a twin-screw river steamer, a salvage tug which is to have engines of 1,200 i.h.p., other two smaller tugs, and a passenger tender.

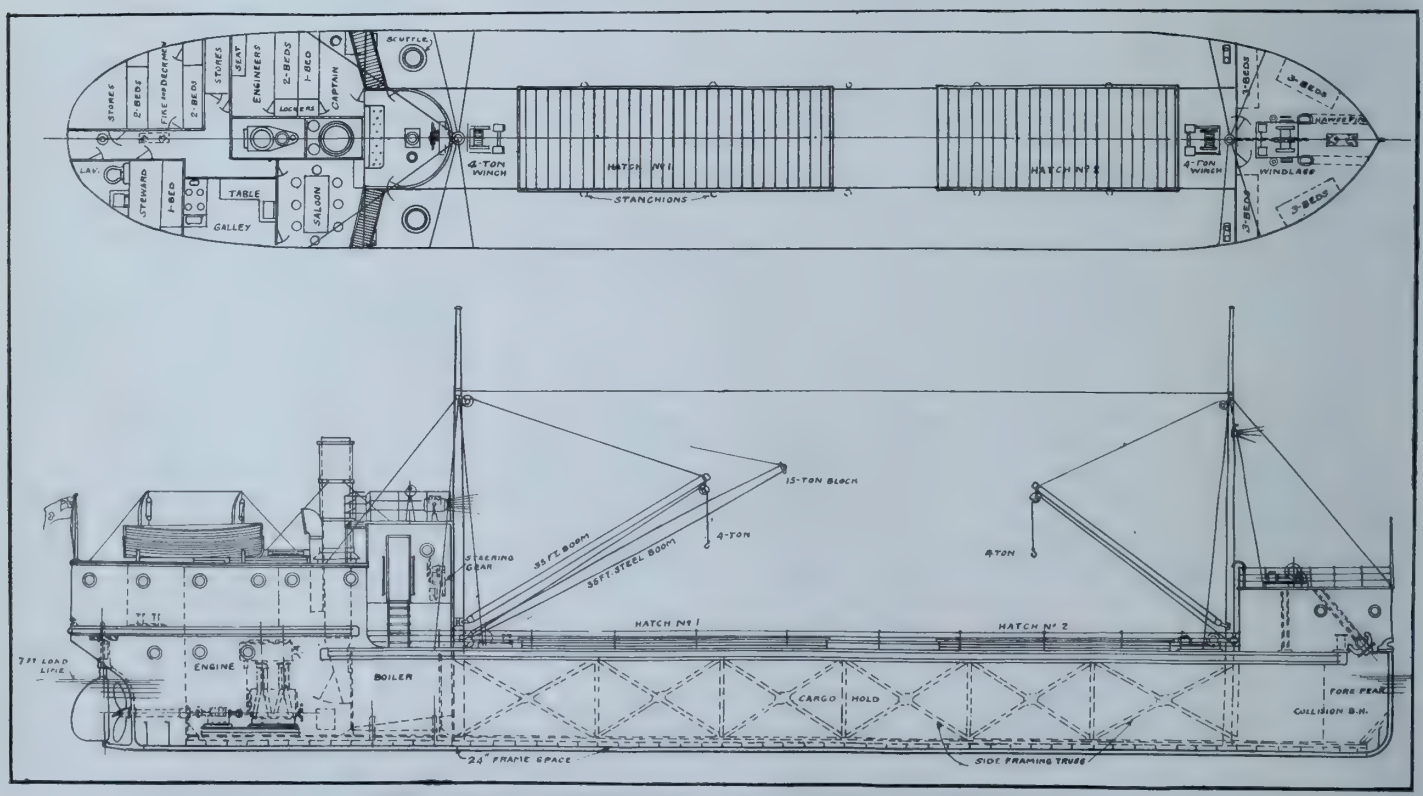
STEEL LIGHTERS FOR HUDSON BAY.

THE Polson Iron Works, Ltd., Toronto, have recently been awarded a contract by the Dominion Government for two steel steam lighters, for the Department of Railways and Canals, for service at Port Nelson, Hudson Bay. There is at present no dock at which ocean-going vessels may discharge their cargoes, and the water is not deep enough to allow them to get close enough to the shore for this purpose. Until the dock is built, these lighters will convey the cargo from the ships to the shore, their draft of only 7 ft. allowing them to do this. Each lighter will have a cargo capacity of 250 tons, and will be well equipped with cranes to enable a rapid discharge of cargo being effected.

The lighters will be of steel construction throughout, and will be fitted with watertight collision bulkheads, ice belts and docking reels. They will be 128 ft. long over all, 120 ft. between perpendiculars, 21 ft. 6 in. moulded breadth and 10 ft. in. from bottom of keel to deck at side. The crew will consist of ten men, whose living quarters will be located aft on a raised deck, at the forward end of which is the wheel house. Extra accommodation will be provided forward also on a raised deck. There will be two masts, each equipped with a 4-ton and a 15-ton crane. The boom for the former will be of wood, and the crane will be operated by a reversing, double drum, steam winch, while the latter will have a steel boom equipped with a 15-ton chain block. This crane will only be used for handling extra heavy weights, and when not in use will be stowed on the deck. Other deck machinery will include a steam windlass for handling the anchors and a steam steering gear.

Each lighter will have a single propeller driven by a vertical fore-and-aft compound condensing engine, with cylinders 10 in. and 22 in. diameter, by 16 in. stroke. The engine will be located aft, and will furnish the drive for the air, feed and bilge pumps. The condenser will be of the surface condensing type. Electric light will be installed throughout, and for this purpose a 6 k.w. high-speed engine and generator will be installed. The boiler will be located immediately forward of the engine-room, and will be of the Scotch, single-end, marine type, 9 ft. diameter by 9 ft. long, built for and passing Canadian Government inspection for 160 pounds steam pressure.

The pumping equipment will include a 5¼-3½-6-in. duplex, brass lined, outside packed, boiler-feed pump and a pump of the same type and size for the bilge service. For the sanitary service, there will be a 3-2-3-in. duplex pump and a 6-in. centrifugal wrecking pump direct connected to a 5 x 5-in steam engine. A full equipment of spare parts for the main engine, auxiliaries, pumps and miscellaneous outfit will be provided. It is expected that delivery will be made by June 1 of this year.



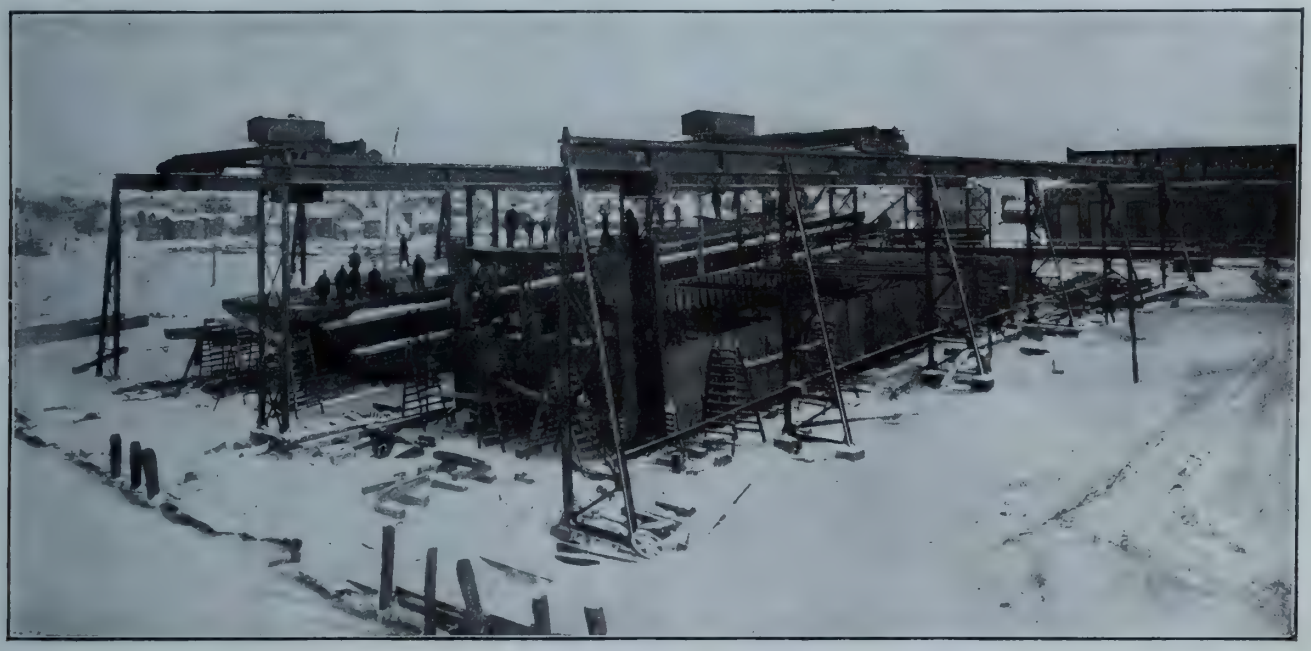
STEEL STEAM LIGHTERS FOR PORT NELSON, HUDSON BAY.

Ship-Building Plant of M. Beatty & Sons, Ltd., Welland, Ont.

Staff Article

The development of the Canadian ship-building industry on our Great Lakes will necessarily be synonymous with the coming into larger prominence of the firm of M. Beatty & Sons, Ltd., Welland, Ont., and a perusal of the accompanying description of the Beatty plant will be sufficient evidence that their location and equipment are not only prepared for opportunity, but are contributory to it.

IN the year 1862 the firm of M. Beatty & Sons was established at Welland, Ont., for the purpose of carrying out shipbuilding and general engineering work. The volume of business became greater than the old plant could take care of, so a site covering about 12 acres was purchased in Welland, alongside the canal, a new plant erected and manufacturing commenced in 1906. The location for a plant of this description is good, being on the highway between the Great Lakes and the St. Lawrence River, and also being connected with the Grand Trunk Railway System. Cheap power is also available from the Cataract Power Co.



VIEW OF SHIPYARD FROM WELLAND CANAL—M. BEATTY & SONS.

General Layout Features.

All the buildings are of reinforced concrete construction and of modern design. They are well equipped to take care of the various products manufactured by the Company which include dipper dredges, steel scows, drill boats, hoisting engines, power derricks, etc. The buildings are amply large to allow for a considerable expansion in the volume of business, and are equipped for the introduction of new specialties when desired. There are at the present time two shipbuilding berths in service, and a new berth is in contemplation, on the completion of which it will be possible to build ships suitable for trading on the Great Lakes. A standard gauge industrial track system connects the various shops with each other and also with a siding from the G. T. R. main line. This system in conjunction with the layout of the various buildings, considerably facilitates the handling of both raw materials and product, thereby keeping operating expenses down and increasing the efficiency of the whole organization.

Shipbuilding Plant.

As already stated, steel scows and dredges form the most important products in the shipbuilding department. For the production of these, there are two berths, each being 270 ft. long by 50 ft. wide, and equipped with an overhead hand-operated traveling crane having a capacity of 10 tons and a span of 50 ft. The cranes operate the full length of each berth and were supplied by the Shaw Electric Crane Co., Muskegon, Mich. The berths lie at right angles to the canal and have sufficient slope for launching purposes. In the yard adjoining the berths, plates and structural steel are stored. Here, also, is installed a hand-operated gantry which operates over a standard gauge track. Compressed air is piped to connections located at various points near the berths and several rivet-heating furnaces are installed.

Boiler and Blacksmith Shops.

Alongside the shipbuilding berths is the boiler shop which is 200 ft. long by 60 ft. wide and has a standard gauge track running down the centre. In this shop all plate and other heavy work is done in connection with the shipbuilding plant and a part is used for laying out the moulds. The boilers for the hoisting engines are made in this shop.

The equipment in the boiler shop consists principally of two 10-ton hand-operated overhead travelling cranes made by the company; a "Hanna" pneumatic riveter with a 10-ft. reach and capable of exerting a pressure of 90 tons. This machine is used principally for boiler work. For bending plates there is a set of plate rolls 9 ft. 6 ins. long, made by the company. There is also a horizontal 42-in. plate punch and a "Bertram" 12-ft. radial drill. Jib cranes are installed with the larger machines.

The blacksmith's shop adjoins the boiler shop and is 100 ft. long by 50 ft. wide. In this shop are six fires equipped with an exhaust system for carrying away the smoke, etc., and in connection with this system is a motor-driven

"Sheldon" fan. At each fire is installed a jib crane equipped with a Yale & Towne one-ton chain block. There is also a 50-ton "Chambersburg" steam hammer, a "Champion" power hammer by the Beaudry Co., Boston, Mass.; and a bar shear capable of handling stock up to 1¾ inches square and 2 inches round, supplied by the New Doty Mfg. Co., Janesville, Wis.

Adjoining the blacksmith's shop and at the south side are two storages, one on each side of the track. These are used for storing bars, etc., and steel plate respectively.

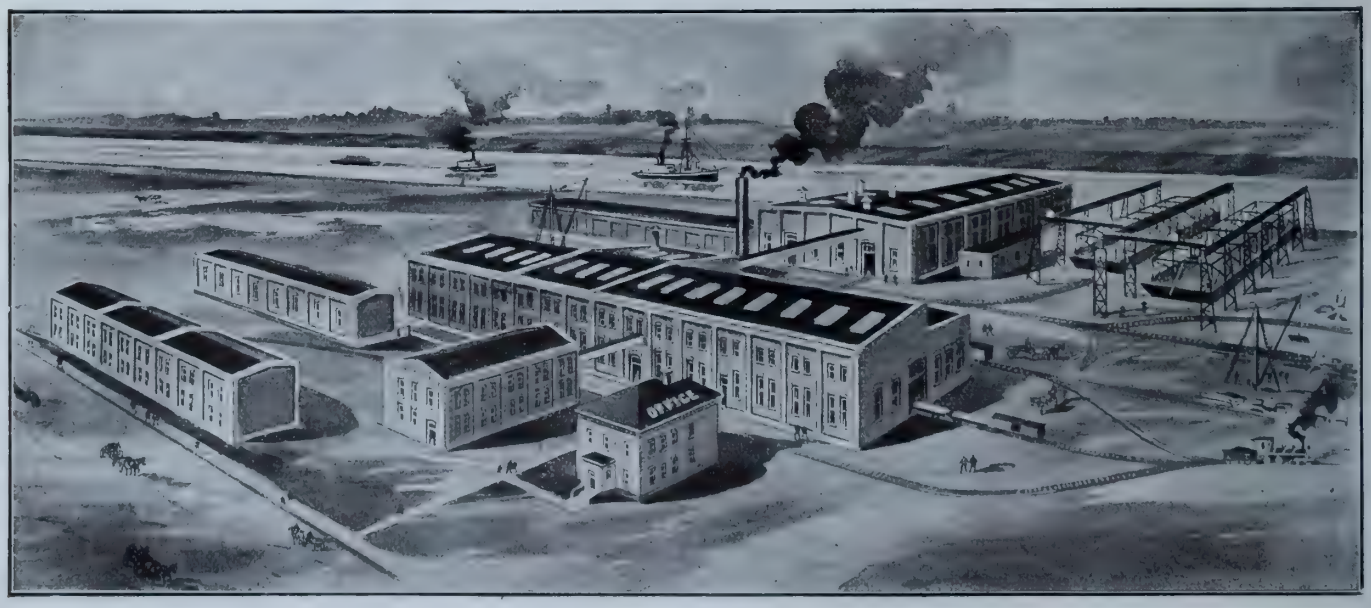
Machine Shop.

The machine shop is a substantial reinforced concrete building 160 ft. by 90 ft. It is divided into two bays, the main bay being 50 ft., wide and the side or west bay 40 ft. wide. Steel columns carry the crane tracks over the main bay, the distance from floor to the crane rails being 20 ft. The "Niles" crane is operated by 220 volt D.C. motors, and has a capacity of 15 tons with a span of 50 ft. A standard gauge track runs the full length of the main bay and connects with another track entering the shop at the end, from the west side and connecting with the boiler shop.

The west bay is 40 ft. wide and has a clear height of about 18 ft. At the north end are the tool stores and wash room, the rest of the floor space being utilized as a machine shop where are installed the lighter machine tools with a bench for fitters along the wall. The tools for the heavier work are installed in the main bay, in the centre of which the hoisting engines are assembled. The hoisting engines are made either with or without boilers to suit customers' requirements. There are a number of jib cranes installed throughout the machine shop, all equipped with Yale & Towne chain blocks.

The machine shop is well equipped with a number of modern machine tools designed to use high speed steel. The principal tools include a 100-inch vertical boring mill supplied by John Bertram & Sons Co., Dundas, Ont.; a 42-inch engine lathe by the London Machine Tool Co., London, Ont.; a 48-inch x 20-ft. Bertram planer; a 72-inch Bertram radial drill and a 42-inch radial drill

INTERIOR OF MACHINE SHOP—M. BEATTY & SONS.



BIRD'S-EYE VIEW OF PLANT—M. BEATTY & SONS.

by the Cincinnati Bickford Tool Co., Cincinnati, Ohio. These machines all have individual motor drives, while the smaller tools are driven from the main line shaft which in turn is driven by a 40-h.p. Canadian Westinghouse 220-volt a.c. motor. The smaller tools include principally 24-inch and 28-inch engine lathes supplied by the Gisholt Machine Co., Madison, Wis.; No. 4 and No. 5 "Cincinnati" milling machines; a 20-inch shaper by the same company—the Cincinnati Milling Machine Co.; a Bertram 72-inch horizontal boring mill and a 22-inch Lodge & Shipley lathe.

Foundry and Core Room.

Adjoining the south end of the machine shop is a building 53 ft. long by 90 ft. wide with a standard gauge track running down the centre and connecting with the machine shop. On the east side is a general store room and on the west side is the cleaning room.

On the south side, and a continuation of the same building is the foundry and core room. The foundry is 100 ft. long and 60 ft. wide, while the core room on the west side is 80 ft. long by 30 ft., wide. The cupola room at the north end of the core room is 20 ft. x 35 ft. In the foundry are two 10-ton electrically operated "Niles" cranes with a span of 60 ft., and operating over the full length of the building. There are two ovens in the core room, each 15 ft. wide, by 30 ft. deep. They are equipped with "Kinnear" rolling doors and are heated with natural gas. There is an overhead runway in connection with each oven, equipped with 1-ton Yale & Towne chain blocks. Adjoining the core room is a 36-inch "Whiting" cupola, and the charging floor is served by a "Beatty" electric hoist and conveyor.

The pattern shop is situated near and on the east side of the foundry. It is 90 ft. long by 50 ft. wide. This shop, like the others, is of reinforced concrete construction and has a floor above, which is used as a lumber storage. The equipment includes an overhead hand-operated travelling crane equipped with a 2-ton Yale & Towne Triplex block: a 12-inch buzz planer; a 26-inch surface planer; a 36-inch band saw; rip saw, etc. A number of these machines were supplied by the Canada Machinery Corporation, Galt.

Power Plant.

Power rates being comparatively low, the company use outside power entirely which is obtained from the Cataract Power Co. The current is stepped down from 2,200 volts to 220 volts by three 200 K.W. Canadian Westinghouse transformers located in the transformer house adjoining the power house. The power house contains the air compressors and a Canadian Westinghouse motor generator set which supplies D.C. current at 220 volts to the crane motors. This is an 85 K.W., 3-phase machine running at 766 R.P.M. The switchboard was supplied by the Canadian Westinghouse Co., and has 3 panels equipped with an ammeter, 2 voltmeters, 2 oil circuit breakers, an integrating watt meter and switches.

A considerable amount of compressed air is used throughout the plant, and for taking care of this service, three Canadian Rand air compressors have been installed. The largest of these machines is a cross compound compressor with air cylinders, 12 in. and 20 in. diameter, by 18 inch stroke. It has a capacity of 1170 cu. ft., of free air per minute against a pressure of 100 pounds at 180 R.P.M., and is driven by a Canadian Westinghouse 200-H.P., 220 volt A.C. motor, running at 625 R.P.M. Another compressor has air cylinders, 9 inch and 14 inch diam., by 12 inch stroke, with a capacity of 320 cu. ft. of free air per minute against a pressure of 100 pounds, and runs at 150 R.P.M. This machine is driven by a 75-H.P., 220-volt, A.C., Canadian Westinghouse motor. The third compressor has air cylinders 8 inch and 12 inch diameter, by 12 inch stroke with a capacity of 250 cu. ft. of free air per minute against a pressure of 100 lbs. at 160 R.P.M., and is driven by a 60-H.P. 220-volt A.C. Canadian Westinghouse motor. The compressors are all of the horizontal cross compound type, the cylinders being fitted with Corliss inlet valves and poppet outlet valves.

Adjoining the power house is the boiler room which contains a 100-H.P. Robb Mumford horizontal return tubular boiler and a Sturtevant duplex 5¼-3½-5 inch boiler feed pump. The boiler provides steam for the ventilating system, heaters, fan engine, and for heating the offices.

Heating and Ventilating.

The ventilating system was supplied by the B. F. Sturtevant Co., Boston, Mass., and is located on the floor above the store room. The system consists of a 10-ft. diameter steel plate fan driven by a 10-H.P. vertical Sturtevant steam engine, and five sections of heating coils supplied with live steam from the boiler. The piping is arranged so that each section is controlled independently of the others in order to obtain a variation in the final temperature in the shops according to the outside temperature. The warm air is carried in galvanized iron ducts to the various shops where it is distributed by branches leading from the main duct. Electric light is installed throughout the shops which are equipped for the most part with 100-c.p. tungsten lamps.

General Features.

Other buildings include a storage, 130 ft. by 35 ft., for hoisting engines. This is located at the south-east section of the plant. A building of similar dimensions is used for a pattern storage. Near the main road is the office building which is two storeys high. On the ground floor are the private and general offices, while the drawing office is on the floor above.

Parsons Geared Turbine Steamship "Cairnross"

By J. H. W.

Geared turbine propulsion in British marine engineering practice is now advanced well beyond the experimental stage. What follows is a brief description of the first merchant vessel designed for and fitted with this type of equipment.

ADVANTAGE was taken of the arrival of the S.S. Cairnross at Montreal, shortly before the close of navigation, to inspect her turbines, which are of the Parsons geared type. She is the first cargo steamer to be specially designed for this arrangement of propelling machinery, and, consequently, she attracted considerable attention from engineers during her short stay in port.

The steamship Cairnross is the property of the Cairn Line of Steamships, Ltd., Newcastle-on-Tyne, England. She was built on the Tees, having been launched from the yards of Wm. Dox-

THE GEARED TURBINE CARGO STEAMER "CAIRNROSS."

ford & Son, Ltd., in January, 1913. While she is the first steamer of her type to be fitted with Parsons geared turbines, her owners did not adopt this system of propulsion without giving the matter very careful consideration. The results, however, obtained on board the S.S. Vespasian in 1908, which vessel was the very first to be fitted with turbines of this type, were so satisfactory that they felt that even better things might be expected of the Cairnross; and subsequent events have fully justified their opinion.

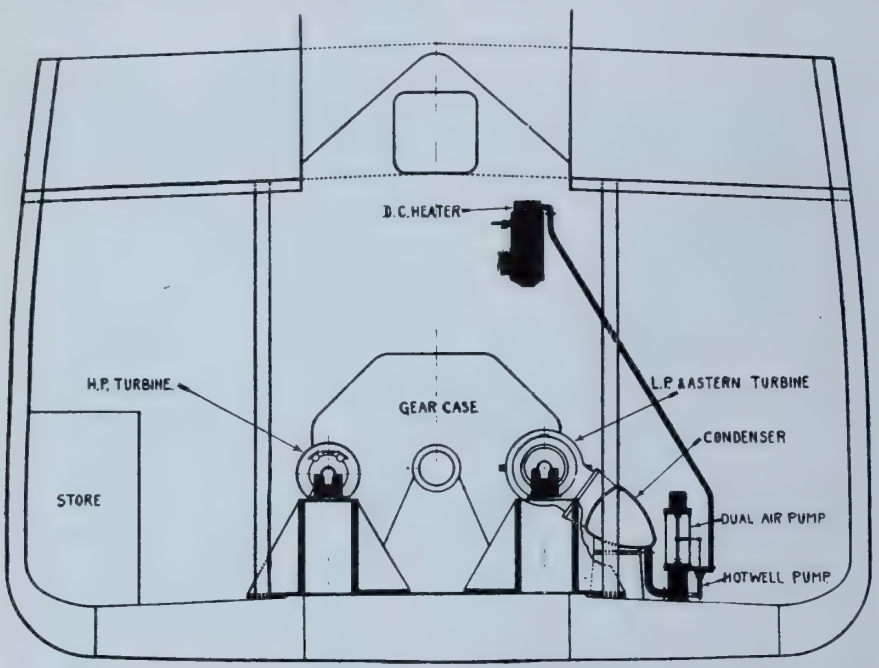


FIG. 1—DIAGRAM SHOWING TYPICAL INSTALLATION OF PARSONS GEARED TURBINES ON A CARGO VESSEL.

The Vespasian was an old steamer purchased by the Parsons Marine Steam Turbine Co., Ltd., for experimental purposes. She was originally driven by triple expansion engines, which the company removed, replacing them by geared turbines of about 1,000 shaft horse-power. These proved extremely satisfactory, and since that time two cross-channel steamers for the London and South-Western Railway Company service between Southampton and Havre have been built with the same type of turbines, and also several torpedo boat destroyers, the total power so far constructed amounting to over 26,000 h.p. There is now under construction turbine machinery and mechanical gearing representing a transmission of more than 120,000 h.p. It will thus be seen that the problem is far advanced beyond the experimental stage.

The Cairnross is a steel cargo steamer of 4,016 tons gross registered tonnage. She is 370 feet long between perpendiculars, and has an extreme width of 51 feet and a moulded depth of 27 feet 9 inches. Her propeller has a cast iron boss and four bronze blades. It is 17 feet 6 inches in diameter, and has a pitch equal to the diameter. Her average speed at 65 r.p.m. is about 10 knots. Steam at 180 lbs. pressure is generated in three Scotch single-ended boilers, 14 ft. 9 in. in diameter by 10 ft. 6 in. long, each boiler being fitted with three Fox's corrugated furnaces. Natural draft is used, the top of the funnel being 76 feet above the grate bars.

The propeller shaft is driven by two Parsons reaction geared turbines in series, there being a high pressure and a low pressure turbine placed one on either side of the shaft. The arrangement of a typical installation is shown diagrammatically in Fig. 1, which is taken from a paper read before the North-East Coast Institution of Engineers and Shipbuilders in the spring of 1913. For all practical purposes it represents the arrangement on board the Cairnross, the only difference being the form of connection to the condenser and of the condenser itself.

The turbines of the Cairnross develop about 1,700 shaft horse-power when running at their full power speed of 1,700 r.p.m., the power being transmitted to the propeller shaft through mechanical gearing. The two turbine shafts are connected by flexible and sliding couplings to two pinion shafts. Each pinion shaft is carried on three bearings, and between these bearings pinion teeth are cut on enlarged portions of the shaft. There are two pinions on each shaft, the two sets of teeth being cut spirally right and left-hand; so that the arrangement really consists of double helical gears with the apex cut away. Fig. 2 is a diagram of the arrangement.

The pinions are of nickel steel, 5¾ inches in diameter, and they mesh with a 12 ft. 6 in. gear wheel mounted on a shaft forward of, and coupled by, the usual flanges and bolts to the thrust shaft. This large gear wheel consists of a heavy cast iron centre with a chrome nickel steel band, 2½ inches thick, shrunk on and pinned. In this band the teeth are cut, the operation having been performed on a special hobbing machine. Enclosing the pinions and gear wheel is a heavy cast iron case, seen on the left in Fig. 3, and embodied in this are the bearings for the pinion and main gear shafts. The heavy casting gives a very rigid support to the shafts, and also

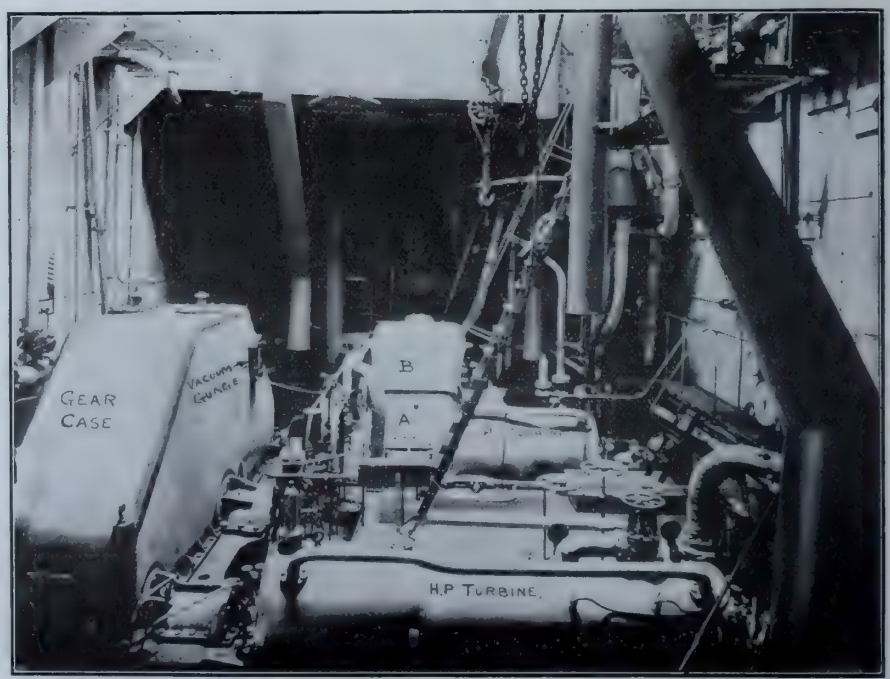


FIG. 3. ENGINE ROOM OF "CAIRNROSS," SHOWING PARSONS GEARED TURBINES OF 1,700 S.H.P.

serves to reduce the noise set up by the gearing.

Lubrication of the Gears.

The gears are lubricated by large jets of oil, which impinge on the line of contact of the teeth. The oil feeds down by gravity from a tank located on the engine room bulkhead at a point about 17 feet above the bearings. From the gears the oil falls to a closed tank in the double bottom, and is thence returned by a steam-driven pump to the elevated tank after passing through a filter and a cooler. The latter is supplied with water from the main circulating pump. The

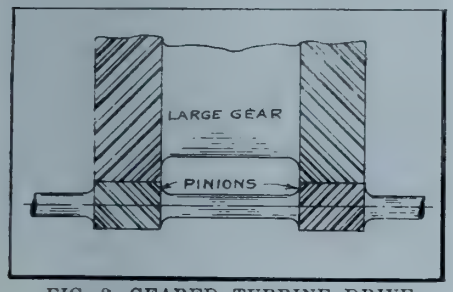


FIG. 2—GEARED TURBINE DRIVE DIAGRAM.

elevated tank has a capacity of 500 Imperial gallons, sufficient to keep things running for ten minutes should the pump fail.

The best oil for lubricating the gears was only arrived at after several trials. Finally, a thick carbon-filtered pure mineral oil, known under the trade name of "alvoline," was adopted and has given great satisfaction. The same oil is used for the turbine and gear-bearings.

Further Details.

For going astern there is an astern turbine embodied in the after-end of the port, or low pressure turbine. Both exhaust into the same connection, so that when the vessel is going ahead, the astern turbine revolves idly in a vacuum, and when going astern the low-pressure turbine does the same. The position of the astern turbine is indicated at (A), Fig. 3, and the connection to the condenser at (B).

The auxiliaries include a Wier dual air pump, in which the wet and the dry pump are both worked off the same steam cylinder. This easily maintains a vacuum of 28½ inches. The circulating pump is of the steam-driven centrifugal type with a 36-inch impeller.

Early Trials of the Cairnross.

About a month after this steamer was completed, a coal consumption trial was carried out in which she was pitted against a sister ship, the S.S. Cairngowan. The latter is fitted with exactly similar boilers and propeller, but has triple-expansion reciprocating engines. The trial lasted for 36 hours, during which the two vessels steamed side by side, a distance of about a mile separating them. The coal supplied to both ships was identical in quality, and was measured in the same way; and when results came to be checked up it was found that the turbine vessel showed an economy of 15 per cent.

General Remarks.

At the present date the Cairnross has steamed about 45,000 miles and has never given the slightest trouble. No wear whatever can be discerned in the gearing,—a testimonial to the extreme care taken in its design and manufacture by the Parsons Marine Steam Turbine Co.

The geared turbine for marine work has been looked upon as the only satisfactory method of securing a high, and therefore economical, speed for the turbine blades, combined with an efficient speed for the propeller, and now that practical experience has proved that the manufacture of reduction gears of high efficiency for the purpose presents no special difficulties, this form of ship propulsion will doubtless rapidly grow in favor. It is claimed that the friction loss from the gearing does not amount to more than 1½ or 2 per cent., and this, of course, is much more than offset by the increased efficiency of the turbine engines over those of the reciprocating type.

The simplicity of control in a turbine installation is remarkable. As may be seen in Fig. 3, there are four hand wheels near the forward end of the high pressure turbine. One of these controls the main stop valve, a second admits live steam to the L.P. turbine casing when desired, and the other two admit live steam to the h.p. and astern turbines respectively. Beyond the opening and closing of these valves, nothing is needed beyond occasional slight adjustment of the steam supply to such glands as are steam packed against the drawing in of air.

It is interesting to note that on the trial trip of the Cairnross a speed of

WINDSOR & PELEE ISLAND NAVIGATION CO. STEAMSHIP "PELEE" READY FOR LAUNCHING.

two knots was obtained by shutting off all live steam and utilizing the exhaust of the auxiliaries to drive the L.P. turbine. Moreover, before being so used, the exhaust was passed through the feed heater. Thus the vessel can be navigated with very great economy in foggy weather or when entering harbors, etc.

WINDSOR & PELEE ISLAND NAVIGATION CO. S.S. "PELEE."

THERE was launched by the Collingwood Shipbuilding Co., Collingwood, Ont., in December last, the steam-

STERN VIEW OF S.S. "PELEE."

ship Pelee, built to the order of the Windsor & Pelee Island Navigation Co., for passenger and package freight traffic from Pelee Island. The Pelee is 145 ft. long, 24 ft. beam, and 18 ft. 3 in. deep, and, in addition to a commodious dining saloon and long public room for day passengers, she is fitted between decks for the carriage of tobacco and general package freight.

The propelling machinery consists of one set of triple expansion jet-condensing engines, with cylinders, 12½-21-34 in. diameter by 21 in. stroke, and one Scotch marine boiler, 12 ft. 6 in. diameter by 11 ft. long.

THE LARGEST HARBOR CRANES IN THE WORLD.

By C. F. Krumbiegel*

THE immense increase in size that has taken place in war and merchant vessels during the last twenty years has naturally resulted in a corresponding development in shipyard and harbor facilities. It has been found necessary to improve and enlarge harbor equipment that it might be commensurate with the giant dimensions of the latest vessels; and last, but not least, it has been found necessary to provide the most modern and efficient cranes in order to facilitate the building of such vessels and to enable a large tonnage to be handled quickly and with as little labor as possible.

As a proof that engineering science and capital have been fully able to keep pace with modern requirements, a description is here given of two giant cranes, one a land crane and the other of the floating type. These may be considered the latest word in crane building and have been designed and built by the Deutsche Machinenfabrik, A.G., (Demag), Duisburg, Germany.

The Largest Land Crane.

Figures 1 and 2 show the largest land crane in existence to-day. It is a hammer-head crane of 250 tons capacity and was built for Blohm & Voss, Hamburg, in 1913. It is a revolving crane with a working circle of 500 feet diameter, and has a raising jib designed to clear the masts of ships very much larger than the greatest now afloat. In its highest position, the top of the jib is 327 feet above ground level. On the top chord of both jibs there runs a slewing crane with a capacity of 20 tons at 33 feet radius, or 10 tons at 58 feet radius.

The main trolley, which runs within the main jib, is able to lift 250 tons at a

BOW VIEW OF S.S. "PELEE."

radius of 97 feet or 110 tons at 174 feet radius. The lifting speeds are as follows:—

Load.	Speed.
250 tons...about	5 feet per minute.
200 tons...about	6.4 feet per minute.
100 tons...about	13 feet per minute.

FIG. 3—250-TON FLOATING CRANE, PANAMA CANAL TYPE.

*Resident Engineer, Gerald Lomer, Ltd., Montreal, Canadian Sales Agents for Demag, Ltd.

The trolley speed with a load of 250 tons is 32 feet per minute, and the jib can revolve through a complete circle in 12 minutes. When the jib is to be raised, the slewing crane is brought to the rear end, and the main trolley is fixed at the point of the jib, these operations only occupying a few minutes. The crane can then be loaded as before.

To give an idea of the enormous dimensions of some of the parts, it may be mentioned that the spindles for raising the jib have a diameter of 18 inches and a length of 69 feet, while the bottom block of the 250-ton hook has a length of 15 feet. The entire drive is electric, the output of all the motors totalling 524 H.P. The operation of the crane, with all its lifting and slewing motions, requires only three men.

The Largest Floating Crane.

As an example of the largest cranes of the floating type, there may be cited the two 250-ton cranes for the Panama Canal, ordered in April, 1913, by the United States Government, and at present under construction in the Demag Works. Each of these cranes will have a raising boom with a working circle of about 240 feet diameter, and their height will be equal to that of an 18-storey building.

The pontoon, which is entirely of steel plate, has a length of 145 feet, a width of 88 feet and a depth of 16 feet, and is well balanced at every position of the load. The four columns of the tower reach through the deck down to the bottom of the pontoon to ensure a very rigid connection of both parts. About three feet above the pontoon deck, and rigidly riveted to the tower, is the supporting ring for the rollers, which are carried by the so-called bell. This bell is supported on the king journal of the main tower by means of a heavy box lattice girder, the lower edge of which is level with the boom hinges.

In the forward part of the bell is placed the operators' house, which contains all the apparatus for controlling the crane. There are two main hooks of 125 tons capacity each, which can be connected by a 250-ton loop. Besides this, a climbing hoist of 15 tons capacity is provided for lighter loads. For lifting the heavy sluice gates of the canal, both cranes may be worked together, giving a total capacity of 500 tons.

These cranes are not yet completed, but Fig. 3 shows the type. This illustration has been taken from a somewhat smaller crane, which is shown moving a slewing crane into another position. The large crane in this illustration was supplied to Friedrich Krupp's Germania shipyards at Kiel. It is worthy of note that Demag have built more than 50 per cent. of all existing giant cranes.

As Canadian ports are now being developed to meet the ever increasing traffic requirements, it is hoped that the above description may be of interest to engineers and others. This country is in

FIG. 2—250-TON HAMMER-HEAD CRANE WITH JIB RAISED.

the fortunate position of being able to equip her harbors from the start with the most up-to-date loading devices, in place of having to make the best of old-fashioned equipment installed many years ago, as older countries may sometimes have to do.

DOMINION FISHERIES VESSEL "GALIANO."

THE Fisheries steamer Galiano is now on her way to Esquimalt, B.C. She is on her way to Esquimalt, B.C. She is the second of the two cruisers ordered by the Canadian Government from the Dublin Dockyard Co., Ltd., for protection of fisheries on the Pacific coast and for hydrographical purposes. The Galiano is in every way similar to her sister ship, the Malaspina, a full description of which was published immediately after her trials about three months ago.

The Galiano is built to the highest class of Lloyds, is 162 ft. long between perpendiculars by 27 ft. beam by 13 ft. 11 inches moulded depth, and is fitted out to very high class specifications, with excellent accommodation for officers and men. Electric and search lights, Marconi apparatus, refrigerating machinery, four boats including a motor launch, and a first-class navigating outfit, etc., form part of the equipment. The machinery has been installed by David Rowan & Co., Glasgow, and consists of a set of triple expansion engines with separate auxiliaries—mostly in duplicate, such as Weir feed pumps, circulating pumps, bilge or ballast pumps, air pump, evaporator, feed heater, ash ejector, etc. Steam is supplied by a large single ended boiler equipped with Howden's forced draught system.

The same high average speed was obtained on the six hours official trial under cruising conditions, as with the Malaspina, viz. 14¾ knots, and the machinery worked with the utmost smoothness throughout. Stopping, starting and turning trials were successfully carried out, and it was noticed that the vessel

FIG. 1—250-TON HAMMER-HEAD CRANE.

could be brought up from a speed of 14 knots to dead stop within 60 seconds.

Both the Malaspina and Galiano were built to specifications and plans supplied by the Department of the Naval Service of Canada, and their construction was supervised by Mr. R. L. Newman, of Montreal, and Mr. F. L. Warren, of London, England.

SHIPBUILDING AT LIVERPOOL 60 YEARS AGO.

THE accompanying picture, reproduced from the Illustrated London News, of Oct. 25, 1856, gives a view of John Laird's Liverpool shipbuilding yard, opened by him four years previously, and run in addition to the establishment at Birkenhead. The latter was founded by his father, William Laird, in 1824, the first iron ship being launched five years later. The elder Laird was wont to declare that his was the first yard where iron shipbuilding was practised on a big scale.

He constructed the first iron vessels for the United States, and he turned out the pioneer iron vessels for the navigation of the Euphrates, Indus, Nile, Vistula and Don. The first of the armed iron vessels owned by the East Indian Co. were likewise built at Birkenhead; while, according to the historian of the 'fifties, the first iron vessel ordered by the Admiralty was a product of Mr. Laird's yard. Other owners who availed themselves of his services were the French Messageries Imperiales Co. and the Franco-America Co., but the largest vessels launched up to 1856 were the P. & O. Company's Nubia and Alma, of 2,200 tons and 500 h.p. They were for some time among the fastest vessels afloat, and much interest was aroused by the performance of the first-named in running from Calcutta to Suez at an average speed of 11 knots, which was at that date a record voyage.

At the time the view of the Liverpool yard was published, John Laird had just laid out a new establishment at Birkenhead, the area covered by the old one being required in connection with the construction of the Birkenhead Docks. The new yard, which was described as the most complete of its kind in the country, contained four graving docks and a gridiron, together with every facility for the building and repairing of iron and wood vessels, and for boilermaking and machinery repairing.

SHIPBUILDING AT LIVERPOOL SIXTY YEARS AGO—A VIEW OF MR. JOHN LAIRD'S YARD OPENED IN 1852.

LLOYD'S REGISTER OF SHIPPING APPOINTMENTS.

THE general committee of Lloyd's Register have appointed Mr. Westcott S. Abell, Professor of Naval Architecture at Liverpool University, to succeed the late Dr. S. J. P. Thearle in the office of chief ship surveyor to the society. Mr. Charles Buchanan, who was Dr. Thearle's senior assistant, has at the same time been promoted to the position of principal of the chief ship surveyor's staff.

These appointments are of great importance to the shipping community, not only of the United Kingdom, but also of other maritime countries. At the present moment the tonnage classed in Lloyd's Register Book exceeds 22,500,000 tons, 40 per cent. of which is owned outside the United Kingdom, while the tonnage in course of construction with a view to classification exceeds 2,000,000 tons.

Professor Abell.

Professor Abell, who was born in 1877, has had a distinguished career. His professional education commenced in the Royal Naval Engineering College, Devonport, and was continued at the Royal Naval College, Greenwich. In 1900 he was appointed to the Royal Corps of Naval Construction; from 1904 to 1907 he was professional secretary to the Director of Naval Construction; and for the next three years (following in the steps of the late Sir William H. White and Sir William E. Smith) he held the position of instructor in naval architecture at the Royal Naval College.

In 1910 he was selected to fill the chair of naval architecture at Liverpool University. The professional reputation which he has won for himself, at a comparatively early age, is illustrated by the fact that he was appointed last year by the Board of Trade to be a member of the Load Line Committee, which is now sitting to consider the existing freeboard tables, and was selected as chairman of a sub-committee to prepare draft rules for submission to the International Con-

ference recently held. Professor Abell's duties in this capacity have involved the investigation of the relation of strength of structure to freeboard, and also an exhaustive comparison of the varying rules and practice of the several classification societies.

Among the technical papers which have been read by Professor Abell may be mentioned one on the general action of capsizing forces before the Liverpool Engineering Society, and one on methods of calculation for investigating the safety of ships in damaged condition before the Institution of Naval Architects.

Charles Buchanan.

Mr. Charles Buchanan, for whom the office of principal of the chief ship surveyor's staff has been created, is one of the best known and most popular naval architects of the day. He has been altogether associated with mercantile shipbuilding throughout his career. Prior to joining the service of Lloyd's Register in 1880, he held the position of chief draughtsman with the well-known firm of A. McMillan & Sons, Dumbarton, Scotland, and later he enjoyed a varied experience of his profession at various shipbuilding ports in Great Britain.

Since 1891 he has been stationed in London, holding for the last seven years the position of assistant to the chief ship surveyor. For many years past he has been associated particularly with the duty of dealing with plans of vessels submitted for the committee's approval, and this work has given him a probably unique knowledge of all the latest developments of shipbuilding practice throughout the world. Mr. Buchanan has lately been appointed by the Board of Trade to be a member of the Departmental Committee on Bulkheads and Watertight Compartments in Ships.

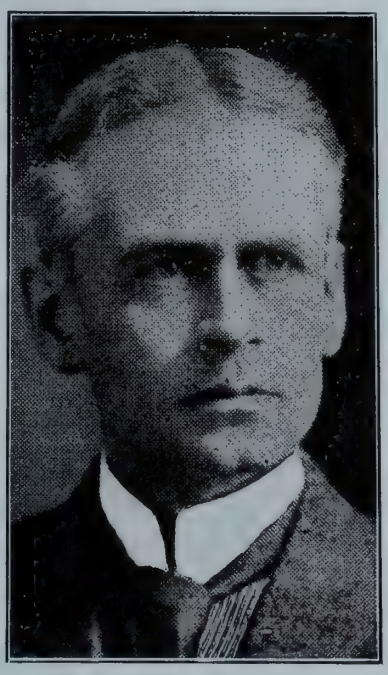
In addition to the foregoing, the committee of Lloyd's Register have appointed Mr. T. B. F. Benson, naval architect, Toronto, to be their surveyor for the district of Lake Ontario and Collingwood, Ont.

GEORGIAN BAY CANAL COMMISSION.

W. SANFORD EVANS, former Mayor of Winnipeg, it is learned, will head the Commission which the Government proposes to appoint to consider the economic feasibility of the Georgian Bay Canal proposition. The Commission, it is expected, will be officially named in a few days, and will consist of three members—one from the West, one from Montreal, and the other from Ontario. Huntley Drummond, of Montreal, has been favored by many as the Quebec representative, but a French-speaking man may be selected. Unofficially, ex-Mayor Laporte is spoken of. Save as regards the chairmanship, however, no decision has been arrived at.

It will be recalled that some years ago a complete survey for the projected work was made and the cost was estimated at $100,000,000. There has since been a revision of the estimate and the figure now is placed around $125,000,000.

The reports made so far established beyond question the practicability of the canal as an engineering work. What the Government now wishes is a report as to the economic side of the undertaking. Very naturally before embarking upon a transportation scheme of such magnitude it desires to know whether it would be a paying proposition and ful-



W. SANFORD EVANS.

fil the object for which it has been sedulously propagated for half a century. The Commission to be appointed will have full inquisitorial powers.

Mr. Evans is a Winnipeg financial broker. He was born at Spencerville, Ont., in 1869, the son of Rev. Dr. J. S. Evans; was educated in Hamilton and at Victoria University, and in 1897 began a newspaper career. He was editor of the Winnipeg Telegram 1901-5, and Mayor of Winnipeg 1909-11. He was president of the first Canadian Club (Hamilton, Ont.) formed in Canada. He married Miss Irene Gurney, of Toronto, in 1900.

SAFETY DEVICES AT SEA.

WHILST delegates from all the world have been assembled in London to "confer" on the all-important question of the safety and equipment of ocean-going passenger steamers, the lines themselves have been by no means inactive. In characteristic style the Allan Line are making their new ships Alsatian and Calgarian not only the best, but also the safest. An interesting introduction which the new steamers bring are motor lifeboats fitted with 30 h.p., 4-cylinder paraffin engines, each capable of taking about ten ordinary lifeboats in tow. These motor lifeboats are 28 feet long, with a cabin occupying more than half their length, also a considerable freeboard, giving good head-room in the cabin.

Reports from the International Conference show that all the recommendations made have already been embodied in the Alsatian and Calgarian, besides such important additions as the motor lifeboats, etc.

FERRY WAR OVER.

THE war between the town of Sarnia and the Port Huron & Sarnia Ferry line is over. The Loughead estate has relinquished the lease of the town dock. Ever since the ferry line placed itself outside the jurisdiction of the town by-law by operating as a passenger and freight line, the town dock has been the bone of contention between the Company and the Town. The aldermen were unable to make the ferry Company pay rent. The ferry line leases from the Loughead estate, and the dock of the estate adjoins the town dock.

To try and settle all trouble, the Town Council some four weeks ago leased the town dock to the Loughead estate at $100 per annum for a period of ten years. Ex-Mayor John McGibbon, who started the ferry war in his tenure of office, stated in a curt, concise letter to the council that it has exceeded its authority in putting through the said lease by not publishing notice thereof in the papers for a period of four weeks. Mr. McGibbon plainly indicated that he was prepared for battle, and the representatives of the Loughead estate, tired of the continual strife, relinquished the north of the present landing place for the accommodation of the ferry. The cost will be about $2,000.

VOLTURNO OFFICERS EXONERATED.

NO blame can be attached to Capt. Francis Inch or the officers of the Uranium liner Volturno in connection with the fire which destroyed her and 132 of her passengers and crew in mid-ocean on October 11, 1913, nor in relation to her abandonment, according to the judgment of the Court of Inquiry appointed by the British Board of Trade.

The Earl of Desart, who delivered the

judgment, said the cumulative effect of the evidence was that the fire originated not in the steerage, but among the chemicals carried as cargo. It could not however, be attributed to spontaneous combustion.

He paid a tribute to the officers and crew of the Volturno, and concluded his eulogy of them with the remark:

"Of Captain Inch it is sufficient to say he did his duty."

The president of the Court of Inquiry emphasized the necessity of laying down international regulations to compel adequate practice for seamen in the lowering and manning of boats.

ICEBREAKING ON THE ST. LAWRENCE.

THE Quebec Chronicle claims that the action of the Government icebreaker Lady Grey, in breaking up the ice formation at Cap Rouge, has had the effect of choking the harbor of Quebec with floating ice and has so interrupted communication between Quebec and Levis that protests have been made, though, so far, in vain.

Quebec and Levis Board of Trade, and citizens of both sides of the river generally, claim that, on the whole St. Lawrence route, there are only two cities opposite one another who do an extensive trade throughout the winter, yet they are made to suffer by communication being interfered with by the floating ice which is allowed to choke the harbor, and this done, so the paper claims, at the behest of a few Montreal shipping men.

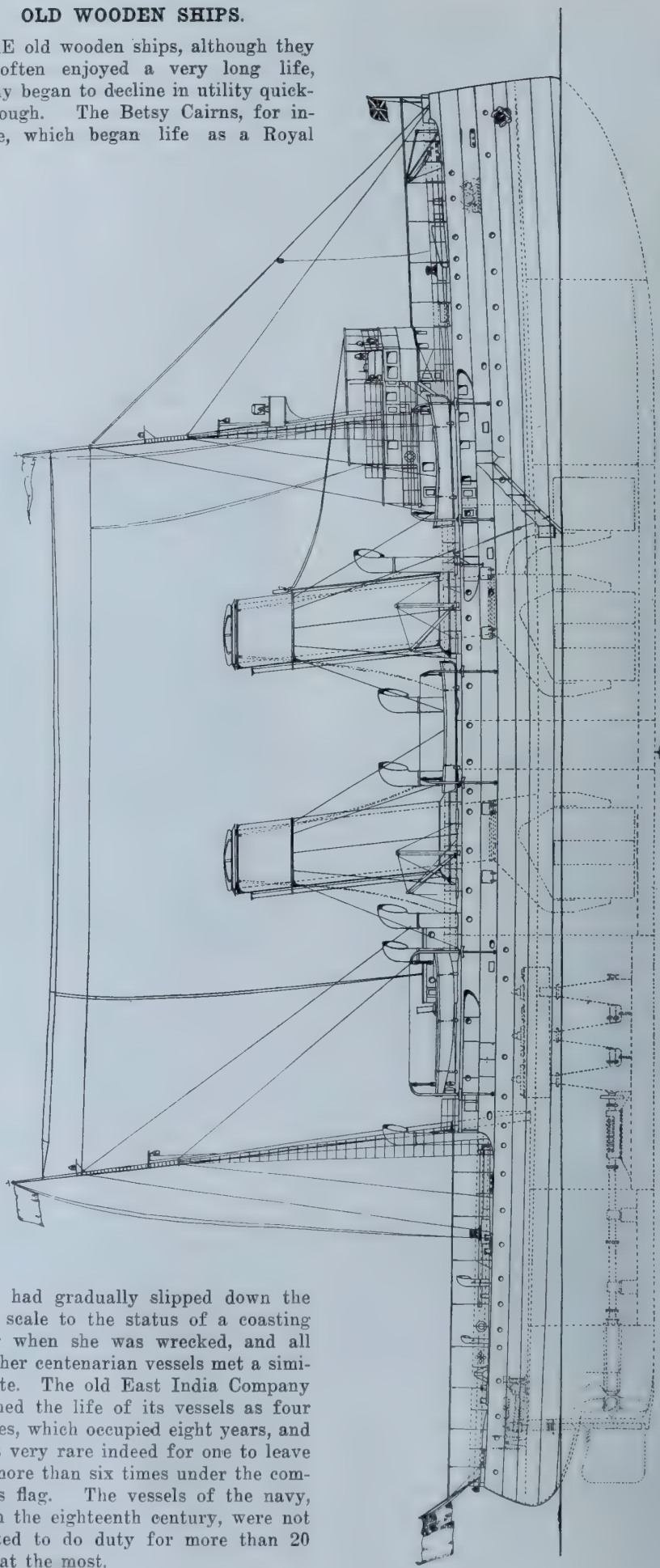
It is further stated that the management of the Intercolonial Railway, appreciating the good work being done by the Quebec & Levis Car-Ferry Co. service, is anxious that the ice-breakers should cease cutting away the ice at Cap Rouge in order to permit the car-ferry to run all the winter.

Wasted Effort.

Harbormaster Sullivan, of Quebec, is quoted by the Chronicle as saying that the work done by the ice-breakers does not in the least assist the cause of earlier navigation from Montreal to Quebec, in the spring. The work done by the ice-breakers is, according to him a useless task. The channel will remain frozen, in spite of all that the ice-breakers can do, until the middle of March, at the earliest, and will only break up then owing to the action of the sun's rays, and not in consequence of the work of the ice-breakers. "Even should the channel be open from Montreal to Quebec earlier than usual," Mr. Sullivan is quoted as saying, "it is of no benefit to the port of Montreal, as the ocean shipping will continue their scheduled sailings to Halifax, St. John and Portland, to the very end."

OLD WOODEN SHIPS.

THE old wooden ships, although they often enjoyed a very long life, usually began to decline in utility quickly enough. The Betsy Cairns, for instance, which began life as a Royal yacht, had gradually slipped down the social scale to the status of a coasting collier when she was wrecked, and all the other centenarian vessels met a similar fate. The old East India Company reckoned the life of its vessels as four voyages, which occupied eight years, and it was very rare indeed for one to leave port more than six times under the company's flag. The vessels of the navy, too, in the eighteenth century, were not expected to do duty for more than 20 years at the most.



CANADIAN GOVERNMENT STEEL ICE-BREAKER VESSEL FOR WHICH TENDERS HAVE BEEN CALLED. LENGTH OVER ALL, 292 FT. LENGTH B.P. 275 FT. BREADTH MOULDED, 56 FT. 9 INS. DEPTH MOULDED, 32 FT. MEAN DRAFT, 19 FT. INDICATED HORSE-POWER, 8,000. SERVICE, THE ST. LAWRENCE RIVER.

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Vol. IV JANUARY, 1914 No. 1

PRINCIPAL CONTENTS.

THE COMING OF A GREAT INDUSTRY.

WHETHER our sentiments, convictions or politics be in line or otherwise, there is gradually being ushered in an era of Canadian history, in which shipbuilding and marine engineering—mercantile and naval, with their attendant and accessory industries, will contest and possibly usurp in importance those manufactures which at present occupy premier place in our national economy.

Evidence is available on every hand that an insistent and well-defined policy is being pursued by several powerful "Old Country" corporations interested in various departments of marine engineering and ship-building, towards the creation on our shores of enterprises of that nature, and while in some quarters little heed is being paid to such happenings as the prosecution towards completion of the plants of the Canadian Vickers', Ltd., and the Armstrong, Whitworth of Canada, Ltd., and to the purchase by Yarrow's of Glasgow, of marine interests on the Pacific Coast, these are no less real and definite stages in the ship-buildingization of this Canada of ours .

A few months ago, we published not only a descriptive and comprehensive article covering the Vickers' plant at Montreal, but in addition gave official information concerning the near future date of its completion, including equipment for service. The plant of Armstrong, Whitworth of Canada, Ltd., which was described more or less briefly in our Annual Review Number of Canadian Machinery, is meantime, of course, reputedly more or less of a tool steel proposition, but who believes that the Canadian market is so attractive for the disposal of that product as to warrant such a heavyweight corporation settling on our shores. The advent of Yarrow & Co., on the Pacific Coast is another step in the ladder, and the merging of our lake and river steamship companies into one gigantic combine, known as the Canada Steamship Lines, Ltd., makes provision for catering to the ship-building corporations as the enterprise develops. Irrespective of our views on a "Laurier Navy," or a "Borden Emergency," there is being scientifically and systematically developed a policy which will put Canada in a place of honor relative to the industries of ship-building and marine engineering, and when economic conditions are considered, who is there that can reasonably find fault?

The world's ship-building and marine engineering returns for 1913 are now public property, and, as anticipated, constitute a record. As was to be expected, Great Britain again takes premier position in tonnage launched, and engine horse-power installed. It is, however, worthy of note that other countries have shown considerable development and progress, both in the number and size of the vessels launched. We in Canada still occupy a somewhat obscure place in the record, and were it not for the preparations now being made, there would be little hope of our getting much higher up. Strenuous efforts are being put forth in the United States to raise the production standard of its ship-building and marine engineering, although little success is as yet apparent, and emulating as we do our American brethren in so many other directions, we might do worse than follow their example in propagating these twin industries in our own land.

Over-much is made of the cost of labor in Canada when compared with Great Britain, for after all, the difference against us is of little moment. During the year just gone, labor troubles in the matter of "strikes" did some material hurt, but these were really insignificant when the matter of "broken time" falls to be taken into account. In the shipyards and engineering works of the "Old Country," particularly the former, the "broken time" feature amounts to a positive curse, and had it not been for the unprecedented extent to which it attained during 1913, the output record would have been increased by many thousand tons.

Many men work from two to four days a week only, yet earn in most cases sufficient for the purpose of a livelihood to themselves and those dependent. If these men stuck to their work as, we are glad to say, our Canadian operatives do, then the wage preponderance in favor of Canada would entirely disappear, and the bugbear of high production cost with it. This feature is not being lost sight of in the planning of ship-building plants on our shores, and with the materials of construction costing little more, there is no drawback to the forward progress of the Canadian ship-building industry.

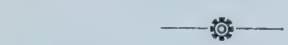
ISHERWOOD CONSTRUCTION FOR MOTOR SHIPS.

THE Isherwood system of construction, which is every day becoming more popular for cargo-carrying steamers, appears to be particularly well suited to vessels of the oil engine class, and more especially to those large motor coasting vessels now being fitted with hot-bulb or low compression residue oil engines. Shipowners and shipbuilders who have already had to do with hot-bulb engines are well aware of how the question of vibration must be carefully studied when designing the engine seating for such installations.

There is no getting away from the fact that there is more vibration from an oil engine than from the steam reciprocating set. This, however, need not deter the shipowner from taking to the motor vessel, only it is one of those important points which should be carefully considered by the shipbuilder who has not already turned out sea-going vessels driven by slow-running oil engines, also by the committees of the different societies.

The Isherwood ship is particularly strong longitudinally in the bottom, a feature which must appeal to owners who contemplate building Diesel or semi-Diesel engined vessels. Furthermore, the motor coaster of anything up to 400 tons d.w. carrying capacity is every other day working in and out of port, and from time to time she may be taking the ground in a tidal harbor and shipping heavy cargoes.

Vessels of this class cannot have their bottoms too strongly constructed; it being not a question of drawing up the scantlings to meet sea-going conditions, but really to meet harbor conditions. In all oil-engined vessels, longitudinal strength is of the greatest importance, and here the Isherwood system of construction undoubtedly scores.



PROJECTED NEW WATERWAY TO HEAD OF LAKES.

A PROJECT for the joint construction by the Governments of the United States and Canada of a deep waterway for ocean-going steamers from Montreal to Duluth, Minn., has been inaugurated through the International Joint Commission, which has jurisdiction over the boundary waters of the two countries.

The discussions instituted through the International Joint Commission are the result of a recent conference in Washington, in which Secretary Bryan, Chairman James A. Tawney, of the American section of the International Commission, and Senator Charles E. Townsend, of Michigan, participated. It was arranged that the matter should be taken up first with the Canadian Government through the commission, and Chairman Tawney will confer soon with T. Chase Casgrain, K.C., chairman of the Canadian section.

Utilize Present Bodies of Water.

Several routes have been proposed for the waterway, the cost of which is estimated from $100,000,000 to $300,000,000, but the one most favored in the United States provides for the utilization of all the lakes and the St. Lawrence River. This route, it is contended, would not result in any material lowering of the waters of the Great Lakes, while it is said that a considerable change in the lake levels would result if any other proposal was decided upon.

Senator Townsend, of Michigan, is one of the most ardent advocates of the project. He said recently that it does not require an economist nor an expert traffic man to show the economy which would result to the stupendous industry of the Middle West of the United States and Canada if the burdens of reshipment were removed and cargoes could be loaded at lake ports and unloaded at the ultimate destination.

This benefit would be increased by the similar advantages resulting to inbound freight rates from the Atlantic coast and from foreign ports, but these benefits coming directly from the actual use of the ocean waterway would not be the only ones enjoyed by industry.

Reduce Railroad Rates.

Such a waterway would produce the result which has always followed, and will always follow from the creation of water transportation—namely, it will cause a reduction of railroad rates and an improvement of rail facilities from all points, on even remotely competitive rail lines.

Senator Townsend recognizes three obstacles to the realization of this project. The railroads will oppose it, the international complications will have to be met, and the cost necessarily will be so great as to make its realization difficult. He believes that if the question were properly handled, the Government of Canada undoubtedly could be persuaded to join in the scheme, the burden of cost to be shared on the basis of proportionate benefits accruing to each country.

Until the Governments have actually agreed on the project, Senator Townsend believes it would be wise for the United States to plan every harbor improvement on the Great Lakes with a view to the ultimate construction of a 35-foot channel from Duluth to Montreal.

LACHINE CANAL TRAFFIC STATISTICS.

THE annual statement of the traffic of the Lachine Canal for 1913 contains statistics supplementary to those which have been published month by month, throughout the season.

The number of vessels which have navigated the canal this year is 664, of which 171 were Canadian, 35 American, 271 Canadian barges or scows, 11 American barges, and 176 American canal-boats. These vessels had a combined tonnage of 239,377 tons, and made a total of 10,197 trips, so that, counting the tonnage every trip, a total of 4,977,557 net tons was operated during the season. The vessels carried altogether 4,171,092 net tons of grain and miscellaneous cargoes. The number of passengers carried through the canal and down the Rapids was 107,073. Besides other vessels, 97 rafts were operated, having a total of 48,500 linear feet.

The number of up trips exceeded the down by 123, but the down tonnage exceeded the up by 19,149 tons. The down cargo tonnage exceeded the up by as much as 2,017,280 net tons. Down passengers numbered 81,508, and up passengers only 25,565, an excess in favor of down passengers of 55,943.

The largest tonnage up in single commodities was in pulpwood and pulp, the former measuring 126,938 cords, equal to 380,814 tons, and the pulp weighing 13,100 tons, a total of 393,914 net tons. The heaviest cargo tonnage down was in grain and coal. The total grain down was 1,408,651 tons, and the total coal 1,260,201 tons.

Lumber, Sand and Coal.

Lumber sent up into the canal-basin totalled 101,479 tons; and down, 146,345 tons. Sand up from the harbor to the canal-basin totalled 81,488 tons and down, 102,399 tons. Trips made up the canal light for return cargoes of grain, coal, sand or lumber, numbered 3,406.

Annual Comparison.

The total number of trips made in 1913 was 10,197, an increase of 637 over 1912. The total combined tonnage operated was 4,977,559 tons, an increase of 858,195 tons; the total grain and miscellaneous cargoes operated totalled 4,171,092 tons, an increase of 916,943 tons. The 107,073 passengers carried in 1913 represented an increase of 17,516.

The number of vessels for 1913 was 104 less than in 1912, and their combined tonnage showed a decrease of 12,142 tons, and this in spite of the marked advance in the figures of cargoes carried. Coal brought down to the harbor or landed on the canal-banks increased by 493,447 tons.

Cargoes Operated.

Canadian vessels brought chiefly, apart from grain, lumber, cement sand, bricks, butter, cheese, firewood, scrap-iron, hay, steel products and square timber. American canal-boats brought iron pipes, molding sand, salt, lumber, black clay and resin. Many of the latter, after discharging their cargoes, proceeded to Ottawa for lumber.

The grain-traffic, as previously stated, showed a net increase of 17,037,757 bushels; pulpwood an increase of 45,178 cords, and pulp a decrease of 16,242 tons. Two cargoes of pulpwood were brought from Norway during the season, one of 1,331 tons by the new lake steamer Glenfoyle, and another of 1,400 tons by her sister ship, the Keyvive.

LAKE CARRIERS' ASSOCIATION MEETING.

THE year 1913 was a record-breaker for the Lake Carriers' Association, both in volume of business and in disaster, according to the report of William Livingstone, president of the organization, submitted at the annual meeting on January 22. President Livingstone in his report also referred to the Wilson-Lafolette seamen's bill which, if passed, he said, would "work great hardship on the lake fleet."

The second week in November was responsible for the great casualty record of the year. During that time 235 lives were lost in the series of storms that swept all the lakes, according to the report.

Record Coal Movement.

"More ore, coal and grain were moved in 1913 than have ever been moved before," said Mr. Livingstone, "and the rates such that the business was profitably handled. Five cents more was paid on ore and coal to Lake Michigan ports than the rates prevailing in 1912. The grain rate was somewhat lower than the averages for 1912, but was nevertheless profitable. The ore movement totalled 49,070,478 gross tons, which was 1,634,701 more than the movement of 1912.

Lakes' Greatest Disaster.

"Up to November, casualties had been few and unimportant. No modern vessels had been destroyed, and the loss of life was the lowest in years — namely nine. However, fate ordained that the second week of November should mark the greatest disaster in lake history.

The storm was cyclonic in character, waves running one way, and when the storm had subsided, eight staunch ships, representing the best of American, Canadian and British shipyard production, had totally disappeared on Lake Huron, and two more had disappeared on Lake Superior, with a loss of 235 lives. Not a soul was saved on any of these ten ships. Six of these total disappearances were vessels belonging to the Lake Carriers' Association.

In addition, two barges foundered on Lake Michigan, and a lightship foundered in Lake Erie, while six vessels became constructive total losses by either being thrown upon the beach or by being pounded by heavy seas. Twenty modern carriers stranded in the blinding gale, entailing heavy repair bills. Practically every vessel out in the storm found a visit to a shipyard necessary for repairs.

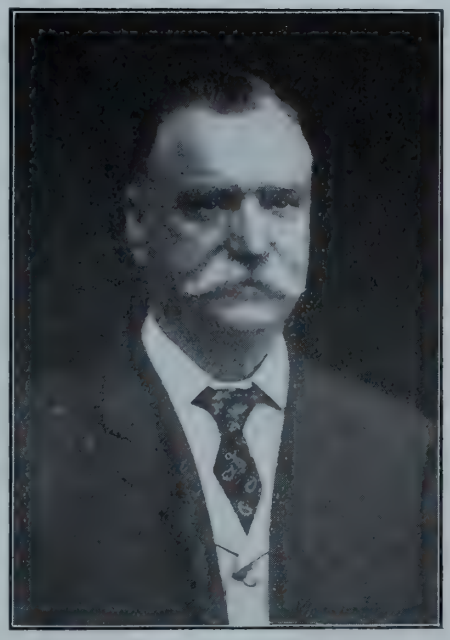
The Death Benefits.

Under its welfare plan, the Lake Carriers' Association paid out $18,245 in death benefits during 1913, $17,285 of this amount being occasioned by the November disasters.

The report stated that little complaint was heard during the year concerning labor conditions and such complaints as cropped up, were for the most part trifling and easy of adjustment.

THE LATE CAPTAIN J. J. RILEY.

CAPTAIN James Johnstone Riley, superintendent of pilots at Montreal, and examiner of candidates



CAPTAIN JAMES JOHNSTONE RILEY.

for certificates as masters or mates, died at the Mount Royal Sanitorium January 8, after a short illness. A severe cold developed into pneumonia a couple of days previously, and the sons of the deceased captain persuaded their father to leave the St. Lawrence Hall Hotel, where he was residing, and enter the sanitorium. A fatal issue of the illness was not anticipated prior to the night of January 7, when the patient took a turn for the worse, succumbing to the malady the following morning.

The deceased, who was a native of Cumberland, England, was 76 years of age, and is survived by a widow, one daughter and four sons, John E. Riley, of Los Angeles, Lieut.-Col. Jas. J. Riley, Wm. and George Riley, of Montreal.

Of Sea-faring Stock.

Captain Riley went to sea at an early age, being a member of a sea-faring family, and, during the active portion of his life, sailed to practically every part of the world. His career began on sailing-vessels, and he was always prone to regret the fact that the steamships, which have almost entirely taken their place, do not breed sailors of the old school to which he was so proud to belong.

He took his master's certificate at a comparatively early age, and made several voyages to the Guano Islands, off the coast of Peru, where the cruelties practised on the indentured laborers imported from Macao and elsewhere made a lasting impression on his mind. He also served as chief officer on board the famous Great Britain, which, in the 'sixties, was the crack liner between the United Kingdom and Australia. He was well acquainted with Sydney and Newcastle, N.S.W., as those ports were many years ago, and before they became the busy world-ports they are to-day.

Examiner Without Salary.

For many years, Captain Riley was associated with the Allan Line of steamships, but finally settled in Montreal, where he began to practise the business of an underwriter in 1879, and marine insurance inspector. Finally he accepted the post of superintendent of pilots at Montreal, and, as has been said, acted as examiner of candidates for certificates as master or mate.

On various occasions also, he fulfilled the duties of Acting Wreck Commissioner, pending a permanent appointment to that office being made.

The deceased, who for many years took a leading part in Freemasonry in Quebec Province, was well-known in Maritime and Masonic circles in New York. He at various times lectured before scientific bodies in that city on subjects with which his profession had made him thoroughly familiar, and news regarding him which appeared in the local press was frequently republished by Shipping Journals in New York, and also in Liverpool.

The "Bitumastic" enamel and solution, manufactured by Wailes, Dove & Co., Newcastle-on-Tyne, England, is being handled in Canada by the Canadian Bitumastic Enamels Co., Toronto. The enamels is employed extensively for coating the interior surfaces of vessel bunkers, holds, engine and boiler-room tanks, bilges, etc., and is used by many of the largest ship and bridge builders in Great Britain and the United States.

MARINE NEWS FROM EVERY SOURCE

Sarnia, Ont.—Dominion Government surveyors are at work on the proposed harbor for this town.

North Vancouver, B. C. — A by-law authorizing the purchase of the Ferry Company was passed recently.

Dump Scows Launched.—M. Beatty & Sons, Welland, Ont., recently launched two steel dump scows, 156 ft. x 36 ft. x 14 ft., each of 800 cubic yards capacity.

Vancouver, B.C.—A. F. Yarrow, head of the Clyde shipbuilding firm bearing his name, announces that he has bought out the British Columbia Marine Railway Co., and intends to establish a branch of his yards at Esquimalt, B.C.

Safety at Sea.—The Hon. J. D. Hazen has given notice of a bill to amend the Canada Shipping Act, so as to make its provisions with regard to safety at sea conform with the International Regulations just adopted at the London Conference.

Victoria, B.C.—The C.P.R. have awarded the contract for lengthening the coastal steamer Princess Mary, to the British Columbia Marine Railway Co., Esquimault, B.C., work to commence early in January. An oil fuel system will also be installed.

Northern Navigation Co.—The annual general meeting of the representatives of the Northern Navigation Co. will be held at the headquarters, Sarnia, Ont. on January 29 and 30. Heretofore, the meetings have always been held in Toronto, but in future they will be held at the above port. Agents from as far west as Winnipeg will be present.

Canada Steamship Lines.—The complete list of directors of the Canada Steamship Lines, Ltd., as officially announced, contains 15 names, including that of Sir Trevor Dawson, London, who has been named honorary president.. There is a London Advisory Board of seven in addition. The distinctly Canadian end of the board is made up of fourteen names, four of whom are practically new men, as they had never been on the old Richelieu & Ontario Board. These are M. J. Haney, Toronto, one of three vice-presidents; D. B. Hanna and Aemilius Jarvis, Toronto, and J. C. Newman, Montreal.

Ottawa, Ont.—Contracts were awarded recently by the Government to W. H. McGillivray, of Ottawa, for the Geodetic survey adjoining the Dominion Observatory, for $61,948; to the Polson Iron Works, of Toronto, for engines for the Lady-of-the-Lake being built at Sorel, $17,250; the Mergenthraler Co., New York, four linotypes for the Printing Bureau, $14,520; and to the Miehle Printing Press Co., Chicago, through the Toronto Type Foundry, presses, $8,407.

Levis, Que.—The shipbuilding firm of George T. Davie & Sons has been acquired by George D. Davie, who will form a new Company, to be known as the Davie Company, Ltd. The Davie firm for years have been closely identified with shipbuilding and salvage interests, and operated the Levis graving dock. George D. Davie will, in all probability, be the President of the new concern, which will be capitalized at $1,000,000.

Steamer Salvage. — The steamer Nicholas, wrecked in the storm of Nov. 9, 1913, arrived at Sarnia, Ont., on Jan. 22, from Alpena, Mich., setting a new record for late navigation on Lake Huron, it being a month since the close of navigation. The boat was in tow and was accompanied by the tug James Reid, whose owners were responsible for the salving of the boat after she had been abandoned by the underwriters. The whistles of the factories and of all the craft in the river sounded a salute for five minutes.

North Atlantic Shipping Conference which met in Paris on Jan. 21, rejected the request of the Hamburg-American The North Atlantic Shipping conference Line for a larger percentage of the Transatlantic steerage traffic. It was announced that all existing agreements in relation to the pooling of the traffic had now expired. The agreements have to do with freight, passenger and steerage rates. The conference debated for eight hours the question of giving the Hamburg-American Line any additional percentage, and after the resolution was rejected, Herr Henekin, director of the North German Lloyd Line, was asked if it meant a shipping war. He replied with a shrug of his shoulders.

Ship Assessment.—Rules prescribing the method of measurement for the basis of assessing tolls on ships in the Panama Canada were issued on November 21 in a proclamation signed by President Wilson. They strictly define the cargo capacity of various types of shipping, and in general are framed on the same lines as the rules of the Suez Canal. In some respects they are more stringent than the Suez rules, but in others are more liberal. The rules do not affect the $1.25 per ton rate previously prescribed in a Presidential proclamation.

New Ferry Steamer Ordered.—George T. Davie & Sons, shipbuilders, Levis, Que., have been awarded the contract by the Canada Steamship Lines to build a ferry steamer to replace the Longueuil, plying between Montreal and Longueuil. The boat, which is to be delivered in July of this year will be 175 feet long, 44 feet beam and will draw eight and a half feet of water. The hull will be of steel, and the engines will be single-screw of high power. Provision will be made for 1,000 passengers and crew and 50 loaded teams. In order that the service be maintained for a longer period than hitherto, the structural arrangements of the hull and equipment to be installed will be along the lines of an icebreaker craft.

Dipper Dredge Order.—M. Beatty & Sons, Welland, Ont., have just closed contract for a steel dipper dredge with hull 100 ft. long, 40 ft. beam, and 10 ft. deep; delivery to be made by May 1, 1914. The dredge is of the crane type, with dipper handle and spuds of sufficient length to make 40 ft. of water. The dipper itself is of five yards capacity. This dredge is to the order of the C. S. Boone Dredging and Construction Co. of Toronto, and they will use it on one of the several large harbor improvement works recently secured. This five-yard dredge is similar to the dredges previously furnished by Beatty & Sons for the Canadian Dredging Co., Midland, Ont.; W. E. Phin, Hamilton, Ont.; the Dominion Dredging Co., Quebec, and others.

Allan Liner Parisian Sold. — The famous Allan liner Parisian has been sold for twelve thousand pounds to an Italian firm.

Sarnia, Ont.—It is reported that the LeBel Lumber Co. is bargaining for another lumber steamer, to take the place of the Lillie Smith, sold last fall.

Three Rivers, Que.—The ferryboat Glacial, plying between Three Rivers, and the G. T. Ry. station at Doucet's Landing, was struck by a large piece of ice and sank near Commissioner's Wharf.

Fort William, Ont.—A committee of the Board of Trade, consisting of J. P. Jones, S. C. Young, J. T. Horne, W. A. Dowler and the president will endeavor to secure Government assistance towards the building of an ore dock at this point.

Sault Ste. Marie, Ont.—P. T. Rowland, local representative of the Lake Superior Drydock & Shipbuilding Co., states that contracts for building the new drydock were settled last week, and that work will begin in the spring.

Vancouver, B.C.—A company headed by Ex-Ald. J. D. McNeill has purchased a water frontage on False Creek, and tenders will be called immediately for the construction of a dock. The land will be developed for industrial and shipping purposes.

Port Dover, Ont.—It is understood that the Government estimates will contain a generous sum for the Port Dover Harbor. Port Dover is terminus of the new Lake Erie and Northern Railway, which will soon connect Galt, Brantford and Simcoe with Lake Erie.

Ottawa, Ont.—Tenders will be received up till March 3rd for the construction of a 15-inch hydraulic self-propelling steel suction dredge. Plans and specifications may be obtained from the Department of Public Works, Ottawa, Ont.

Sarnia, Ont.—The Reid Wrecking Co. of Sarnia will spend nearly $70,000 on their drydocks at Port Huron. A new steel structure equipped with the latest machinery and apparatus for ship repairing will be erected at a cost of about $45,000, and about $25,000 will be spent on a modern new pump house.

Wreck in Bay of Fundy.—The steamer Cobequid ran ashore on the south-western end of the Trinity Ledges, in the Bay of Fundy, a few weeks ago, and is now a total wreck. The passengers and crew were rescued with considerable difficulty, after having undergone a great deal of privation before help located and reached the unfortunate vessel.

Ottawa, Ont.—Improvements to the St. Lawrence route, to the extent of a couple million dollars are in the estimates shortly to be tabled. No less than fifteen large dredges will be working next year mainly between Montreal and Quebec, and two of these will be the new dredges now completing at Collingwood.

Vancouver, B.C.—It is stated that the Dominion Government has made a grant of practically all of the foreshore at Newport, at the head of Howe Sound, to the Pacific Great Eastern Railway for a seaport. The stipulation is that the Company spend $2,000,000 in making harbor improvements.

Montreal Harbor Loan.—The Montreal Harbor Board is applying to the Government for a loan of $15,000,000 spread over a term of years. It is to cover the cost of the new docks, sheds, elevators; to raise the level of the harbor boards railway and operate it by electricity, and to provide for the retirement of maturing debenture indebtedness.

Canada Steamship Lines.—The Canada Steamship Lines, Ltd., has three new boats in view, but what they will be or where they will ply will not be definitely settled until Mr. J. W. Norcross, managing director, returns from England, where he went to consult British interests. The Company will shortly take up the service between Quebec and Bermuda, in which there are believed to be immense possibilities.

Great Lakes Record Losses.—The year just closed was the worst for marine losses in the history of the Great Lakes. The loss to boats during the season will run close to $6,000,000, the largest amount recorded in one season. The loss of life in one season was also a record. The greatest disaster of the season occurred on Sunday, November 9, when the Great Lakes were swept by the worst storm in history, 254 persons going to death and many steamers being lost. During the year, fifteen vessels were wrecked, eighteen sank and one burned to the water's edge.

The British Columbia Marine Railway Co., Esquimalt, B.C., whose shipyards have been sold to Yarrow & Co., Glasgow, was founded in 1893 by W. Fitzherbert Bullen, president, who came from London, Ont. H. F. Bullen, managing director, is a native of the same city. George Gordon Bushby is a director, and manager of the Vancouver branch. Douglas B. F. Bullen, secretary-treasurer, is a son of the president. They retain their interest in the B.C. Salvage Co., and the Vancouver branch of the B.C. Railway Co.

Motor Vessel for Great Lakes—Much curiosity was exhibited among the seafaring class at Shields when the Tyne-built motor vessel, of 1,644 tons register, the Tynemount, owned by the Electric Propulsion Company, of Glasgow, left on her maiden voyage for Santander. She carried a crew of twenty under the command of Captain Watson, of North Shields. Her crew included three engineers, a donkeyman, three greasers, and an electrician, but, of course, no fireman. The Tynemount will do some coasting trade before proceeding to the Great Canadian Lakes, for which she has been specially built.

Montreal, Que.—The Canada Steamship Lines has given a contract to George T. Davie, of Levis, for the building of a new ferry boat to replace the Longueuil, now plying between Montreal and Longueuil. The vessel, which will be 175 feet long 44 feet beam, and drawing eight and a half feet, will have accommodation for a thousand passengers and 50 loaded teams. She is to be delivered in July of this year. The hull is to be of steel, designed to be used when needed as an icebreaker, so that the ferry service may be started earlier and continued later in the season.

C. P. R. to Cancel Service.—The Canadian Pacific steamship service between Trieste and Naples and other Mediterrannean ports is at an end, according to an official statement. The cutting out of the service is due to the alleged persecution the Company claims to have endured both in Austria and Italy. The final action which caused the management of the C. P. R. to take the drastic step would appear to have been the holding up of the Ruthenia by the Italian Government at Naples for a couple of days on charges of having contravened the immigration regulations of the country. It is alleged that the persecutions have been inspired by the so-called "pool" interests.

CANADIAN NAVAL SERVICE OPERATION.

THE operations of the Canadian Naval Service Department during last last year are dealt with in the annual report. The total appropriation for the Naval Branch was $1,660,000, of which $1,085,660 was spent. In connection with the work of the Naval College at Halifax, the report states that nineteen cadets passed the examinations which were conducted by officers of the Admiralty. There are now nineteen cadets in the college, but during the year there was no recruiting on account of the uncertainty as to the future naval policy. In other branches of the service, such as the radio-telegraphic, hydrographic and fisheries protection services, there has been much activity, and very satisfactory progress has been made.

ASSOCIATION AND PERSONAL

A Monthly Record of Current Association News and of Individuals who Have Been More or Less Prominent in the Marine Sphere

T. B. F. Benson, naval architect, of Toronto, has been appointed Lloyd's surveyor for the Lake Ontario and Collingwood districts.

Thomas L. Willson, former president of the International Marine Signal Co., Ottawa, has resigned from the Board of Directors. Lewis Lukes has been elected president of a new board.

T. A. Christy, Chicago, chairman of the American Shipbuilding Co., and J. W. Wallace, Cleveland, of the same company, were in Port Arthur last week looking over the Western Drydock and Shipbuilding plant.

Directors Gave Dinner.—The President and Directors of the Muskoka Lakes Navigation Co., tendered a dinner to the commodore, captains and old employees of the Company at the Engineers' Club, Toronto, on Dec. 29.

Captain James B. Foote, manager of the marine department of the Toronto Insurance and Vessel Agency, has been recommended by the Dominion Marine Association as their representative on the Commission to be appointed by the Government to investigate marine wrecks and disasters on the Great Lakes.

Walter Hazlett, of Kingston, Ont., for some time chief engineer on the steamer Kingston, has been appointed assistant to Captain Gilbert Johnston, mechanical superintendent of the passenger steamers of the Canadian Steamship Lines, Ltd., with headquarters at Montreal. He will be succeeded by David Leslie, of the steamer Rapids King.

Grand Council, N.A.M.E.—The Grand Council of the National Association of Marine Engineers will meet in Kingston, Ont., on Tuesday, February 3, at 8 p.m. This is a biennial function, the last meeting having taken place in Ottawa. Delegates from the various subordinate councils throughout the Dominion will be present, and reports will be made relative to the work and progress of the association.

Vessel Officer Changes.—It is understood through Superintendent Patton, of the R. & O., who arrived in Toronto recently from Sarnia, that some new faces will be seen on the bridge of one or two of the big steamers. The steamer Toronto will be commanded by Captain Laroque, and there is likely to be a new commander for the Corona. Men are already at work on the vessels, overhauling the machinery. It is expected that the first steamer will go into commission about May 1. This is nearly two weeks earlier than formerly.

Naval Dept. Report.—The annual report of the Naval Department, tabled in the Canadian Commons on January 23, states that "the health of the navy has been generally satisfactory." It also says that no recruits have been entered on the Niobe or Rainbow since October, 1911, and that the present complements of the two vessels are so short that they would not be able to undertake "prolonged cruises." With regard to the Naval College at Halifax, the report states that the progress of the cadets has been eminently satisfactory. Seventeen cadets have completed the two year course, and are now taking additional training under the Admiralty on British war vessels. At the end of the fiscal year, there were seventeen cadets taking the course at the college.

LICENSED PILOTS.

River St. Lawrence.—Captain Walter Collins, 43 Main Street, Kingston, Ont.; Captain M. McDonald, River Hotel, Kingston, Ont.; Captain Charles J. Martin, 13 Balaclava Street, Kingston, Ont.; Captain T. J. Murphy, 11 William Street, Kingston, Ont.

River St. Lawrence, Bay of Quinte, Murray Canal.—Captain James Murray, 106 Clergy Street, Kingston, Ont.; Capt. James H. Martin, 259 Johnston Street, Kingston, Ont.; John Corkery, 17 Rdieau Street, Kingston, Ont.; Captain Daniel H. Mills, 272 University Avenue, Kingston, Ont.

ASSOCIATIONS

DOMINION MARINE ASSOCIATION.
President—James Playfair, Midland; Counsel—F. King, Kingston, Ont.

GREAT LAKES AND ST. LAWRENCE RIVER RATE COMMITTEE.
Chairman—W. F. Wasley, Gravenhurst, Ont.
Secretary—Jas. Morrison, Montreal.

INTERNATIONAL WATER LINES PASSENGER ASSOCIATION.
President—A. A. Heard, Albany, N.Y.
Secretary—M. R. Nelson, New York. .. ....

THE SHIPPING FEDERATION OF CANADA
President—A. A. Allan, Montreal; Manager and Secretary—T. Robb, 526 Board of Trade, Montreal.

SHIP MASTERS' ASSOCIATION OF CANADA.
Grand Master—Capt. J. H. McMaugh, Toronto, Ont.; Grand Secretary-Treasurer—Capt. H. O. Jackson, 376 Huron St., Toronto.

GRAND COUNCIL, N.A.M.E. GRAND OFFICERS.

James T. McKee, Box 98 Fairville, N.B.
Grand President.
Thos. Theriault, Levis, P.Q., Grand Vice-President.
Neil J. Morrison, P.O. Box 238, St. John, N.B., Grand Secretary-Treasurer.
Jno. A. Murphy, Midland, Ont., Grand Conductor.
George Bourret, Sorel, P.Q., Grand Doorkeeper.
Richard McLaren, Owen Sound, Ont.
L. B. Cronk, Windsor, Ont.
Grand Auditors.

Directory of Subordinate Councils for 1913.

Name.	No.	President.	Address.	Secretary.	Address.
Toronto,	1	A. J. Fisher,	707 Bathurst St.	E. A. Prince,	59 Ferrier Ave., Toronto.
St. John,	2	H. E. Berry,		G. T. G. Blewett,	36 Murray Street, St. John, N.B.
Collingwood,	3	W. T. Rennie,	Collingwood,	Robert McQuade,	P.O. Box 97, Collingwood,
Kingston,	4	A. E. Kennedy,	395 Johnston Street,	James Gillie,	101 Clergy St., Kingston, Ont.
Montreal,	5	A. F. Hamelin,	3210 Le Tang Street,	O. L. Marchand,	St. Vincent de Paul, P.Q.
Victoria,	6	Alex. McNivern,	P. O. Box 234,	Peter Gordon,	808 Blanchard St., Victoria, B.C.
Vancouver,	7	Andrew T. Roy,	1212 Burrard St.,	E. Read,	859 Thurlow St.
Levis,	8	Helaire Mercier,	3 St. Joseph St.	S. G. Guenard.	Lauzon, Levis, P.Q.
Sorel,	9	Geo. Gendron,	Sorel, P.Q.,	Al. Charbonneau,	P.O. Box 132, Sorel, P.Q.
Owen Sound,	10	W. Robertson,	1030 4th Ave. East,	Richard McLaren,	447 13th St., Owen Sound.
Windsor,	11	Alex. McDonald,	28 Crawford Ave,	Neil Maitland,	221 London St. W., Windsor, Ont.
Midland,	12	Jos. Silverthorne,		Jno. A. Murphy,	Midland, Ont.
Halifax,	13	D. J. Murray,	Victoria Rd., Dartmouth,	Chas. E. Pearce,	Portland Street, Dartmouth, N.S.
Sault S. Marie,	14	Thos. O'Reilly,	153 Queen St.	Geo. S. Biggar,	43 Grosvenor Ave., Sault Ste. Marie.
Charlottetown,	15	J. F. McGuigan,	38 Queen St.	Lem Winchester,	302 Fitzroy St., Charlottet'n, P.E.I.
Twin City.	16	Arthur Abbey	Fort William, Ont.	John A. Smith.	Fort William, Ont.

CANAL HOSPITAL SERVICE.

CONDITIONS approaching those of a well equipped army will prevail in connection with the building of a new Welland Ship Canal. Dr. McCoombs is in charge of the hospital and medical service which the Government is instituting, and says:—

"The main hospital will be on the Havens farm on the Queenston and Grimsby road. This will be thoroughly equipped, and capable of providing accommodation for thirty patients, with small separate places for men suffering from infectious diseases. There will be a thoroughly competent staff of nurses and doctors, as well as good office and clerical staff. At Thorold, we shall have a small branch hospital for about ten patients. This will be used as an emergency hospital, in case of bad accidents. There will be another such branch hospital at Fort Weller."

"Along the line of the canal, dispensaries will be located, where the men who are sick will receive medicine. Three doctors will be constantly patrolling the canal, so that there will be no lack of attention. An ambulance will be established and small stretchers will be in every camp. It is my intention to have the clerks and timekeepers on the canal thoroughly drilled in first aid work. Each will have a medical and surgical case and be taught how to handle it. We shall give a prize of $50 every six months to the man who proves most efficient."

CANADIAN MARINE WIRELESS RULES.

NEW wireless regulations governing navigation throughout the Dominion came into force on January 1, when all provisions of the Act governing Canadian wireless passed last session by Parliament became effective. Roughly speaking, the result of the new regulations is that no vessel carrying 50 or more passengers or going 200 miles or more may hereafter be without wireless apparatus. Winter navigation on both coasts of Canada will feel the effect of the regulations immediately, but it is understood that most vessels engaged in ocean traffic are already equipped with wireless as required.

The main changes necessitated by the Act will be in lake vessels, but this will not be until the resumption of navigation next spring.

ST. LAWRENCE & CHICAGO STEAM NAVIGATION CO.

THE disastrous storm on the Great Lakes last fall was recalled last week by the publication of the annual report of the St. Lawrence & Chicago Steam Navigation Co., which, despite the loss of the steamer James Carruthers, compared very favorably with its predecessors. The company collected $272,794 from the underwriters on the James Carruthers, and provided for the full balance of the cost out of the insurance fund, with a balance of $61,096 being left at the insurance account.

The following statement compares the principal items of the accounts for the past three years:

	1911	1912	1913
Management	$14,233	$ 15,445	$ 19,357
Written off	.....	35,000	.....
Dividends	5%	8%	8%
Carried forw.	141,476	158,645	222,150
Steamship earn	62,210	134,031	150,161
Insurance fund	53,802	109,290	61,096
Bank balance.	37,584	43,278	315,935
Capital stock.	860,000	860,000	900,875

As will be seen, the company's insurance fund suffered severely from the loss of the James Carruthers, but at the close of the year it was larger than at the end of 1911.

CAPTAIN FOOTE NAMED TO INVESTIGATE WRECKS.

THE announcement was made a few days ago that Captain James B. Foote, one of the best-known marine experts of our Great Lakes, and manager of the marine department of the Toron-

CAPTAIN JAMES B. FOOTE.

to Insurance and Vessel Agency, with headquarters in Toronto, had been recommended by the Dominion Marine Association as their representative on the Commission to be appointed by the Dominion Government for the purpose of investigating marine wrecks and disasters on the Great Lakes.

Captain Foote was the unanimous choice of the members. The captain, who, until a few years ago, was actively engaged in sailing operations, has had a varied and interesting career in all departments of Great Lakes transportation, and his knowledge of shipping, the construction of vessels and other features relative to the qualifications of a marine expert, guarantees his capabilities for the position.

He comes from a family of lake captains, and the representatives of the Dominion Marine Association has every reason to believe that he will receive the endorsation as a member of the Commission by Hon. J. D. Hazen, Minister of Marine and Fisheries. The suggestion for a representative on the Commission emanated from the Dominion Marine Association as a result of the recent disasters on Lake Huron.

SITE BOUGHT FOR DRYDOCK.

THE Government has purchased from the Bullen Marine interests on Lang's Cove, Esquimalt, B.C., a site for the Government drydock for the Pacific Coast, as promised some months ago. The plans for the drydock are now being prepared by the Public Works Department engineers, and it is expected that tenders will be called for early in the spring.

The estimated cost of the drydock is approximately four million dollars. It will be of the same dimensions as the new Government drydock at Levis, now under way, and will be capable of accommodating the largest vessels afloat. The dimensions are: Length, 1,150 feet; depth, 40 feet, and width, 120 feet. It is understood that a similar drydock is to be built at Halifax.

The building of these three drydocks will meet a long-standing need in Canada for ship repairing facilities both on the Pacific and Atlantic coasts, and will lay the foundation for the resuscitation of the Canadian shipbuilding industry. Moreover, the policy of constructing big Government drydocks on both coasts is in line with the needs of a Canadian naval defence policy along the lines of the Naval Service Act of 1910. Towards the ultimate adoption of this policy the Government is being steadily compelled by the force of national opinion and by the logic of international developments.

The drydock proposals, with a strengthening of the coast defences at Halifax and Esquimalt, are likely to be the Government's only practical move towards naval defence during the coming session.

Acknowledgment.—We are indebted to our contemporaries, "The Engineer," "Syren and Shipping" and the "Glasgow Herald," for several of the illustrations and data relative to the world's shipbuilding, also Liverpool shipbuilding 60 years ago.

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Vol. IV. Publication Office, Toronto—February, 1914 No. 2

Dredge "Port Nelson" Built by Polson Iron Works Limited, of Toronto

Order placed by Department of Railways and Canals, Dominion Government on the 1st day of April, 1913. Dredge reached Port Nelson after voyage of 3500 miles on the 27th of September.

T. W. No. 1.

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Col Miller

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Dredge portnelson in spite of many difficulties encountered enroute arrived safely on Saturday twenty seventh time of passage sydney bar to portnelson bar twenty days six hours. Dredge behaved splendidly throughout voyage congratulate you on output.

H.B.Saunders

1010am

Telegram sent by Captain Saunders, the well-known marine surveyor and wrecking master, who was placed by the Department in full charge of towing of dredge to Port Nelson.

The advertiser would like to know where you saw his advertisement—tell him.

Suggestions Relative to an Unsinkable Ship Design*

By Geo. W. Dickie, V.P.

On the possibility of building a large passenger liner that would not under any of the known mishaps at sea lose her buoyancy or stability and sink. The subject is one which, outside of its desirable achievement, holds out many attractions to naval architects of an inventive turn of mind.

THE problem of the unsinkable ship has occupied the minds of many, if not all, prominent naval architects since the disaster that overtook the Titanic in 1912. A great deal of legislation followed this calamity, nearly all of which dealt with means of escape for everyone on board a sinking vessel. In a smooth sea and with all conditions favorable, it might be possible to handle and load 80 or 90 boats, and, if they could remain in the vicinity of the disaster, and intelligence reach other ships within a radius of 200 miles, a large proportion or perhaps all of these boats might be picked up. In order that this condition be possible, however, we must assume exceptional conditions.

I am writing this paper on board the Congress, a new vessel on her maiden voyage from Philadelphia to San Francisco. This vessel was designed by myself for the passenger and freight service on the Pacific Coast, and is to run between Seattle and San Diego, the principal stops en route being San Francisco and San Pedro, the port of Los Angeles. Changes in the laws relative to life-saving apparatus added about 25 tons to the designed weight to be carried on the boat deck of the Congress, and in order to maintain the designed stability I had to increase her beam from 53 feet to 54 feet 9 inches, the boats being carried 35 feet above the load-line. With passenger list full this vessel carries 850 people, and should it ever be necessary that they leave the ship during that part of her voyage north of San Francisco, I can hardly conceive of its being accomplished without serious loss of life. The ship itself, even with half the freeboard gone, would be so much safer and more comfortable than small boats or rafts that it is worth much thought, careful planning, some compromises, and considerable money to accomplish the design of a hull which would not lose its buoyancy or stability when subjected to the known disasters of the sea, and which at the same time would not be open to any serious financial or commercial objections.

Individual Type Treatment.

The question of designing a ship that cannot be sunk by any of the known accidents which befall vessels at sea cannot be treated in a general way. The conditions are so varying in different types of vessels that the only way to handle the subject is to assume a certain type and work out the problem in its relation to the assumption. This is what I propose doing in this paper. I have taken a typical large passenger steamer of the following dimensions:—

Length between perpendiculars	800 ft.
Beam, moulded	90 ft.
Draft, loaded	33 ft.

With a coefficient of .64, these dimensions would give a load displacement of 42,130 tons. There would be a complete double bottom, the inner shell being 4 feet from the outer skin, extending from the fore peak to the after peak and up the sides to the lower deck, which would be 15 feet above the base line. The main deck would be 9 feet above the lower deck, the upper deck 9 feet above the main deck amidships, and would extend parallel to the base line from frame 87 to frame 233.

From frame 87 to the stem, this deck would slope down, touching the steam at a height of 26 feet above base, and from frame 233 it would slope downwards aft, touching the stern frame at a height of 27 feet. There would be 12 bulkheads extending from the inner bottom to the upper deck. These would be absolutely watertight, without doors or openings whatever, and would be spaced as follows, the frame spacing being 30 inches:

No. 1, fore peak, frame 24; No. 2 frame 45; No. 3, frame 66; No. 4, frame 87; No. 5, frame 116; No. 6, frame 145; No. 7, frame 174; No. 8, frame 203; No. 9, frame 233; No. 10, frame 254; No. 11, frame 275; No. 12, the after peak bulkhead; the double bottom space being divided in the same manner.

As the horse-power of such a vessel would not be less than 45,000, the boiler compartments and coal bunkers would, to a large extent, control the sub-division, and it will be noticed that I have provided four main boiler compartments, each 72 feet 6 inches in length. Each compartment is intended to take four double-ended Scotch boilers abreast, these to be 17 feet in diameter and with 2 furnaces each, giving 128 furnaces in all, or 2,800 feet of grate surface, to develop 16 horse-power per foot, which would be easy with forced combustion.

It will be noticed that the boiler compartments have a bulkhead at each end 16 feet from the main bulkhead. These bulkheads extend to the inner bottom and skin of the ship, and are built strong enough to support the wall of coal between them and the main bulkhead. They would each have 4 coal bunker doors, one opposite each boiler. Each bunker holds 750 tons, and as there are 8 of them, the coaling capacity would be 6,000 tons, all of which runs out directly in front of the boiler it is to serve. The bunkers would be filled from either side through side doors 3 feet 6 inches square with triangular side pieces forming hoppers when open, thus ensuring quick coaling. The amount of coal provided is sufficient for eight days' steaming at 45,000 horse-power.

I think it will be admitted that this ship could be considered safe from any injury to the bottom below the lower deck, and that danger of sinking would arise from rupture of the skin above the lower deck and under the water-line, which is at the upper deck line. Such danger would arise from collision with another ship at such an angle as would cause penetration, or through striking some stationary mass between the lower and upper decks, opening up several compartments to the sea, as in the case of the Titanic.

Penetration by Collision.

Let us first consider penetration by collision. Here the damage would be vertical, and might, if the striking vessel were large and nearly at right angles, penetrate quite a distance into the side of the vessel. I think, however, that such a disaster could not entail more than three adjacent compartments if near amidships, or, say, 219 feet 6 inches.

What would be the condition with three adjacent compartments near the centre of this vessel flooded? The capacity of one of these compartments would be 163,345 cubic feet, from which would have to be deducted the displacement of the boilers, minus furnaces, tubes and combustion chambers, or 13,120 cubic feet. The coal capacity would also have to be deducted, for if half the coal were used the vessel would be 3,000 tons lighter, and if the coal were all on board it would displace so much water, and for this we must deduct 52,000 cubic feet, and also 1,740 cubic feet for a central watertight passage under the upper deck. This leaves 98,225 cubic feet or

*From a paper read recently before the Society of Naval Architects and Marine Engineers, in New York.

2,806 tons for each of the three compartments that we consider may be possibly injured through collision, or 8,418 tons to be carried by new displacement.

In order to provide the displacement for the condition described above, I would propose to fit what I would term a double upper deck, the upper member of which would be 5 feet 6 inches above the lower amidships and parallel to the base line between frames 66 and 254, at which frames it would rise 2 feet and follow the shear line to the stem and stern.

In case of a collision cutting into the upper member of the upper deck the local damage would be confined practically to the depth of penetration and the width of the striking ship, as the space between these decks would be divided into very small compartments both transversely and longitudinally. As it is, we have between these upper decks 9,730 tons of displacement, which, in case of three compartments being opened to the sea, would leave the upper member still materially above the waterline. If the injury were near the forward end of the ship, the lower member of the upper deck extending downwards reduces the size of the flooded compartments, and the displacement of the contents of the holds—at least 50 per cent. would still further have to be deducted, while the upper member rising at frame 266 and following the shear line would provide sufficient displacement to trim ship till water could be introduced into the double bottom aft. These same conditions would apply in case of serious injury aft. It will be understood, of course, that all openings through the upper deck, such as boiler and engine casings and hold hatches, would be watertight structures for at least 16 feet above the load water line.

Longitudinal Ripping of Ship's Side.

We come now to another form of disaster, the ripping open of the side of a ship for a considerable proportion of her length by striking the projecting edge of some obstruction under the water line. In the case under consideration this might happen between the lower and the upper deck for a great portion of the vessel's length. The five large compartments would add 14,030 tons to the displacement, while the forward holds, assuming that the cargo occupied one-half the space, would add 3,800 tons more, and the after compartments, if they had to be flooded to trim ship, would add 3,400 tons, a total of 21,000 tons. This would sink the vessel 11.86 feet, or 6.36 feet above the upper member of the upper deck amidships, and she would then draw 43.86 feet.

The assumption is to the very limit of the possibilities, yet, for an unsinkable ship, it should be provided against in the design. Between the upper member of the upper deck and the shelter deck there should be no air pores or side lights, or if lights are fitted they should not be arranged to open and the glass should be cast around a wire mesh as a protection against cracking.

Overcoming Objection to Type Ship.

The objection that would naturally present itself to this type of vessel is the apparent waste of space between the upper decks. This space, however, need not be wasted. Forward of frame 66 this space is 7 feet 6 inches high, increasing to 12 feet at the stem, and could be utilized to receive stores of all kinds; the compartments being only open at certain hours for issuing the day's supplies. The space from frame 254 aft, starting at 7 feet 6 inches and increasing to about 12 feet in height, could be divided into cold storage compartments for all the different kinds of provisions. The space amidships, 5 feet 6 inches high, would form the sub-basement for the hotel part of the ship above. All ventilating ducts, salt and fresh water mains and drainage pipes would be arranged in this space so that only vertical piping would be carried to the rooms. The grouping of all piping and ducts which run horizontally would save much trouble both in the design and working qualities of these systems. This I consider a very important feature in such a design, for one of the hardest problems the designer has to face is dealing with pipes and ducts through living quarters, and it is always the horizontal pipes that give trouble. By having the mains of these systems between the upper decks, where they are accessible at all times without the passenger knowing anything about them, a continued source of dreaded trouble is removed, and furthermore, this would not interfere with the proper subdivision of the space.

Cross Section Through Boiler Compartment.

Referring to the cross section through one of the boiler compartments, it will be observed that I have provided a longitudinal passage under the upper deck. This passage would be extended through each compartment, from which it would be entered through the air lock, and it would extend from frame 87 to frame 233. In each boiler compartment on each side would be the living quarters for all the men engaged there. These quarters would be artificially lighted and ventilated. The air would be taken from ducts between the upper decks on the inboard side, discharge at the floor line, and would pass up through ventilating pipes on the outboard side.

It might be objected that these quarters would be hot in spite of good ventilation, but in this connection I consider it quite unnecessary to have much heat in the boiler rooms. The boilers in such a ship would be worked under forced combustion, and in that case the fans for forced draught could draw the air from the outer casing round the smoke stack and uptakes and discharge it into a casing outside the boiler lagging, so arranged that the air would circulate round the boilers on its way to the tubular heaters in the uptakes. Thus any heat radiating through the lagging on the boilers would be taken up by the air for combustion, leaving the fire rooms comfortably cool, and with cold air freely circulated through the living quarters they should be quite comfortable.

The air lock doors into the central passage would be self-closing, balanced doors easy enough for a man to open but certain to close after him, and it would hardly be possible to conceive of any damage to this passage even from a collision with a very large ship. At both ends of this passageway would be stairs in a watertight well leading to the shelter deck. The compartment forward of the forward boiler compartment would contain the main ventilating fans with cooling and heating chambers for the air. These ventilating fans would be supplied from trunks extending well above the weather deck, and their capacity would be such as to insure thorough ventilation throughout the ship. The compartment aft of the main engine room would be the electric generating room. where a sufficient generating plant would be installed to insure perfect lighting, heating, and ventilation.

Objective of the Paper Suggestive Only.

I have not, of course, tried to work out all the details for such a ship. What I have done is intended to be suggestive. A vessel built to carry out correctly such a suggestion would, I am sure, be practically an unsinkable ship. and, with all her fire mains controlled from the interior of the upper deck, it would hardly be possible for a fire to gain great headway.

In bringing this subject before the society, I do not wish to present it as a completely developed scheme. I would have liked very much to have worked the whole matter up in detail and presented complete plans of such a ship, but there has only been time for the simple presentation of the idea of a double deck immediately above the load water line and an arrangement of subdivision below that would permit of the displacement provided between the upper decks, rendering the vessel unsinkable under any of the known accidents that may overtake it at sea. The more I think of it, the more I am convinced that, along the lines I have indicated. a ship can be designed as a commercial problem that could confidently be considered as practically unsinkable.

CANADIAN CUSTOMS CRUISER "MARGARET."

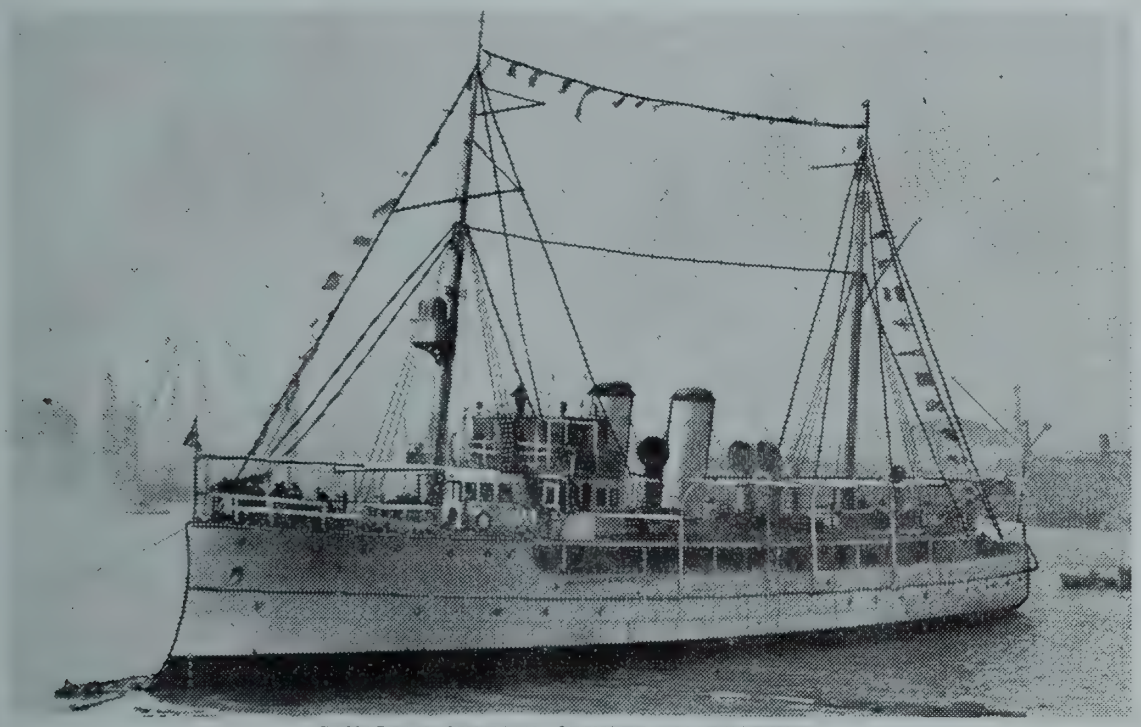
THE revenue cruiser Margaret, built to the order of the Canadian Customs Department for patrol service on the Atlantic Coast, by John I. Thornycroft & Co., Ltd., at Southampton, England, was successfully launched at noon on Wednesday, January 14, the naming ceremony being performed by Mrs. J. B. Kitson, wife of Lieutenant J. B. Kitson, R.N. The vessel took the water in an unusually advanced condition both as regards hull and machinery, the accommodation, etc., as well as the propelling equipment being practically complete. She was, in fact, almost ready for trial when floated. The keel was laid about twelve months ago, and the ship has been built throughout under the inspection of Frank L. Warren, M.I.N.A., M.I. Mech. E., of London. The principal dimensions are as follows:

Length over-all, 200 ft.; length between perpendiculars, 185 ft.; breadth moulded, 32 ft.; depth moulded, 16 ft. The draught is limited to 10 ft. 6 in. when carrying a load of 175 tons. The vessel has a ram stem and cruiser stern. A double bottom is fitted under the engines and the hold forward, and the hull is stiffened to resist ice, the propeller shafting being also housed in the hull for the whole of its length to prevent damage by ice. Water-tight bulkheads divide the various compartments, and the bunkers are also water-tight. Sliding water-tight doors of the quick-closing type are fitted to be worked from the upper deck. The bunkers have a capacity of 200 tons, which is calculated to give a radius of action of nearly 2,000 miles at full speed and about 4,000 miles at economical speed.

The Margaret is rigged as a fore-and-aft schooner, and has an outfit consisting of a 30 ft. Thornycroft motor launch, a 26 ft. lifeboat, a 22 ft. captain's cutter, and a 16 ft. dinghy. For armament, she carries mounted on the forecastle deck, two 6-pounder quick-firing guns of Vickers' latest improved type with telescopic sights. She also carries a wireless telegraphy outfit, is electrically lighted, and has a 24-in. projector searchlight of 25,000 candle-power fitted in crow's nest on the foremast. A refrigerating plant is installed and the cold store contains separate rooms for meat, vegetables, and other provisions. The vessel is heated by steam throughout.

The propelling machinery consists of two sets of vertical reciprocating engines running at 180 revolutions per minute and having a combined indicated horsepower of 2000. The low-pressure cylinders exhaust each into a separate condenser to which the circulating water is delivered by independent centrifugal pumps. A 15-ton evaporator by Weir is installed, and the main and auxiliary feed pumps are also of Weir make. Steam is supplied by two boilers of the water-tube type.

Captain George M. May, late of the Customs Revenue Cruiser Laurentian, will take command of the Margaret on her arrival at Halifax.



CANADIAN CUSTOMS CRUISER "MARGARET."

"ACADIAN" WRECK INQUIRY.

CAPTAIN St. George Lindsay, Dominion Wreck Commissioner, held an inquiry recently with a view to ascertain the cause of the freight steamer Acadian going ashore on Thunder Bay Island during the terrible storm on November 9, 1913. Captain Robt. McIntyre, commander of the Acadian, was the chief witness. He was represented by R. G. Towers, of Sarnia. The Merchants' Mutual Line, owners of the freighter, were represented by Francis King, of Kingston. Captains McMaugh and Ewart, of Toronto, assisted Captain Lindsay. A model of the Acadian was produced, so that the witnesses could better describe the position of the cargo.

Little Grip on Water.

Captain McIntyre said that the Acadian had a gross tonnage of 2,305 and a net tonnage of 1,457. When traveling light her draught aft was 10.6 and 1 ft. forward. She had a speed of ten miles per hour. On leaving the port of Cleveland on November 8 the captain had a total cargo of 2,540 tons, consisting of 775 tons cement, from Belleville; 150 tons iron pipes and 350 tons merchandise from Toronto; 180 tons pipe and 900 tons of barb wire from Cleveland. The rest was merchandise picked up along the route. When the ship left the port she had a crew of twenty men, and was bound for Port Arthur. The wind was fresh from the south-east, and it was raining.

Compass Out.

"On leaving the river," Captain McIntyre said, "there was a deviation of two degrees in the compass." They had no trouble with the instrument as far as Sarnia. The weather was clear and light from the south-west. He took an observation at Sand Light at 11.45 p.m., and the ship's position was 4.3-10 miles off the island.

Altered Course.

The next bearing was taken on the fatal 9th of November at 2.16 a.m., at Sand Beach. Captain McIntyre found the Acadian to be two and a half miles off the island. He remained on the same course until 2.30 a.m., when he turned and proceeded north by north-west. At this time he was going across Saginaw Bay, in Lake Huron. He was steaming ten miles per hour on a course which should have brought him safely past Thunder Bay Island. The water was smooth. At 3.50 a.m. the ship was off Point Aux Barques and the wind was from the north. At 4.20 a.m. the wind was still fresh.

Started to Snow.

Shortly after 8 a.m. it started to snow, and the wind was north by north-east. The storm increased until 11 o'clock, but by noon it subsided a little. The gale then blew north by north-east, and a heavy sea was running.

"What position were you in at eight o'clock?" asked the commissioner.

"We were about 40 miles across Saginaw Bay," was the reply.

"What was the first thing you saw?"

"Thunder Bay Island." This was about 3.15, and the ship was heading on the outside of the island with the port bow towards it.

"Did you see the lighthouse on Thunder Bay Island?" asked Captain Ewart.

"No, I did not."

"Was the fog signal blowing?"

"I do not know. We could not have heard it if it was."

Could Not Steer.

Captain McIntyre continued to say that he tried to steer the Acadian north by north-west, but could not see. When steering this course, the wind and sea would both be on the ship's starboard bow. The captain said he was unable to keep the vessel on this course, and stated that she swung right to the west. He could get her back in the course, but found it utterly impossible to remain in it. The Acadian was now making only two miles per hour.

Although he could not set any definite course, Captain McIntyre figured that the ship was not much out, as she swayed and rolled to both sides of the course at times.

"Was she shipping water?" asked Captain Lindsay.

"Yes," replied witness, "she was shipping water all over."

Sought Shelter.

For the benefit of the court, Captain McIntyre told how he attempted to get in behind Thunder Bay Island for shelter. To attain this end he hauled the ship north by north-west. It was of no avail.

"At 4,20 p.m.," said Captain McIntyre, "she struck. It was still snowing."

"Did you check your engines prior to that time?" queried the commissioner.

"No, only when she threw her screw out of the water."

"How long had you been on that course before you struck?"

"About 35 minutes."

"Then you made about three miles from 3.45 until 4.20?"

"Yes, about that."

"Did you look at the log when the ship struck?"

"Yes, right after."

"What did you do when she struck?"

"I stopped her, sounded the tanks, and applied the pumps. I saw that they could not take the water out, so I let her fill."

"Did you know where you were?"

"I had an idea that we were somewhere about the island."

"How did she strike?"

"She struck about midships, and pounded pretty hard."

Commissioner Lindsay wanted to know if the ship had rolled much previous to striking. Captain McIntyre admitted that she was rolling heavily previous to striking. The captain did not think that this had been caused by the load of pipe on deck. He thought the pipe was well distributed.

On the evening of the 10th a tug had come up to the Acadian, and Captain McIntyre attempted to send a message to the owners, but the wires were all down. After the cargo was lightened and the water pumped out, the Acadian was taken off the island on November 19 at 4.20 a.m. Her bottom was badly damaged from bow to stern.

Cross-examined by Mr. Travers, Capt. McIntyre said he had fourteen years' experience on the lakes. He had found it impossible to use the lead during the storm. The rudder was controlled by steam-gearing.

A Powerful Current.

According to Captain Parsons, there was an uncharted current which only appeared during certain classes of storms, and its course was so erratic that it could not be chartered. He had studied the current for thirty-six years. The phenomenon, said Captain Parsons, settled down the coast toward Saginaw Bay, and he had seen it carry large chunks of ice much faster than a man could walk. He thought that it was this current which caused the Acadian to run up on the shore.

"Many captains coming up the lake think they will land just outside Thunder Bay and are surprised when they find themselves inside the island two or three miles."

"Are the captains warned of this danger?" asked the commissioner.

"Not officially."

"Then how do they know of it?"

"They must learn by experience."

Captain Stevens, of the Kaministiquia, which was the only Canadian ship to successfully weather the gale, knew that there was such a current as described by Captain Parsons. Captain Hagan, of the steamer Howard M. Hanna, told the commissioner how he had tried to keep his boat from going to pieces on the west shore. He had struck the reef and then applied his power to keep the ship on, but she slipped back into the sea and went to pieces.

Had Enough Power.

Commssioner Lindsay questional all witnesses closely with a view of discovering whether they carried enough steam and enough power to take them safely through a heavy storm. He also made several queries as to the steering apparatus and how it was controlled on various vessels. Every captain examined insisted that they had plenty of power and that the gearing was in good condition.

Isaac Boynton, second engineer of the Acadian, was asked as to the orders he received while at the throttle prior to the ship sinking.

"What was your first order?" asked Commissioner Lindsay.

"Stand by."

"What was the next?"

"Half speed."

"What was after that?"

"Nothing."

"When did you get the order to stop?"

"The next day," replied the witness, amid laughter.

Commissioner Lindsay was in the dark until Captain McIntvre. of the Acadian, explained that he had kept the ship on half speed so as to prevent her slipping back into the sea.

Harry Leaney, first mate of the Acadian, told the commissioner that it would have been impossible to cast a line into the sea to take soundings prior to the accident as the decks were iced. Any attempt to do this would have resulted in one being swept overboard.

The investigation was concluded and the commissioner will make a report to the Government on the case.

Data Relative to Wireless Telegraphy Equipment at Sea*

By Professor E. W. Marchant. D.Sc.

Whether the unsinkable ship ever becomes an accomplished fact or not, those,—and they are a rapidly-increasing section of our civilization,—who of necessity or choice take to the sea for a livelihood or other purpose, can do so with the assurance that their chances of inhabiting "Davey-Jones Locker" are to a high degree nullified by the invention and proven worth of Wireless Telegraphy.

WIRELESS telegraphy or wireless signaling is usually associated with signaling by electric or electromagnetic waves, but there are other ways in which signals may be sent without wires, which are older and, up to a certain point, are quite as effective, and I intend, in the first place, to say something about the other methods that have been employed, because, they may make more clear how wireless signaling by electric waves is effected.

Sound and Light Signaling.

The two best known methods of signaling, other than by electric waves, are by sound and by light. For each of these methods we require a transmitter, a transmitting medium, and a receiver. The distance over which transmission can be effected depends on the energy in the form of light or sound that can be emitted by the transmitter, and on the sensitiveness of the receiver. The loudness of the sound that can be used has obvious practical limitations, but if water is used for transmission, the distance at which it can be heard is greatly increased, and in some of the stations that have been fitted, both in Great Britain and the United States, for sending warning signals from submarine bells near the shore, the warning signal has been heard over a distance of several miles.

In signaling by light, the intensity of the source can be increased much more than is possible when sound is used for producing the signal, the limitation of this method being due to absorption of the light under unfavorable atmospheric conditions by fog, and also by the fact that, beyond a certain distance, the curvature of the earth prevents the light from being observed unless it is placed at a considerable altitude. The factor of greatest importance, however, is the absorption of the light by the atmosphere.

Electro-Magnetic Wave Signaling.

In signaling by means of electric waves, or to speak more accurately, electromagnetic waves, the kind of wave that is used is most akin to light, since light really consists of electromagnetic waves. The electromagnetic waves in wireless telegraphy have a wave length of from 6,000 yards to 200 or 400 yards, according to conditions, whereas the wave length of light waves is about 1-50,000th of an inch.

Apart from this difference in wave length and the attendant properties of the waves that it entails, there is no essential difference between the two. The waves travel with the same velocity in both cases, about 190,000 metres a second, or, to put it in terms more easily understood, it takes an electric wave 1-500th of a second to travel from here to Paris, or vice versa. This comparison makes it clear what the essential parts of a wireless station have got to be. There must be at the sending station a means of producing electric waves, and at the other end a means of detecting them.

Sensitiveness of Wireless Receivers.

An interesting comparison has recently been made between the sensitiveness of the three ways of receiving signals from the point of view of energy, by Mr. Duddell, the President of the I.E.E., and he finds that the sensitiveness of the eye and ear are about the same for a normal person, as that of a wireless signaling receiver. The limit of sensibility for light is 1-10th of a candle at a distance of a kilometre, and the limit of audibility for a sound from a tuning fork emitting 42 ergs per second is reached at a distance of 30 yards.

In wireless telegraphy, to cover a distance of 100 miles, it is usual to install what is nominally called a ½ k.w. station, i.e., a station that has generators of about 2 h.p. capacity, making suitable assumptions for efficiency, the energy radiated from the serial being about 300 watts, which corresponds very closely with the intensity of a light which would be visible, according to the above standard, at a distance of 100 miles. The sensitiveness of a wireless detector for electromagnetic waves is therefore very nearly the same as that of the eye for light or the ear for hearing.

Production of Electric Waves.

I will describe very briefly the apparatus that may be used for producing electric waves in connection with ship signaling, and it will only be necessary to consider two systems, the spark system used by the Marconi Company, and the system of quenched sparks used by the Telefunken Company. In both cases, the starting point in the production of electric waves must be a generator, for producing electrical energy. For small stations this may be a battery or an accumulator, but for larger plant a motor generator is usually employed. The motor is driven from the supply of electrical energy on the ship, and the generator which is directly coupled to it is connected to the circuit for producing the electric waves.

The first step in the transformation is to raise the pressure of the current produced by the alternator by means of a high tension transformer to about 30,000 volts. This high pressure current is used to charge up a condenser. The size of the condenser depends on the power of the transmitter, and also to a certain extent on the wave length required. This condenser is connected up through a coil, which is generally called a "jigger," to a spark gap. When the condenser is charged up, a spark takes place across the gap, and a rapidly oscillating current is produced. The rate of oscillation depends on the size of the coil, and on the size of the condenser. The frequency of the oscillation depends on the wave length required.

For a 300-metre wave, the frequency of oscillation is one-million per second, and for a 600-metre wave length it is 500,000. The coil, by being placed near another coil connected to the aerial, is coupled with the aerial. Some of the energy of the oscillation in it is given to the aerial, and gives rise to electromagnetic waves. The use of this "jigger" was one of the most important discoveries in connection with electric wave production, as, by its means, the energy of the oscillating circuit is taken out in little bits and given to the aerial, thus producing a series of oscillations in it which persists for 40 or more periods.

The other method used for exciting the aerial is very similar, the same arrangement of circuit is used, but with a different form of spark gap. This spark gap is known as a "quenched" spark, because the effect of it is to break the current in the oscillating circuit after only one or two swings, and thus to give the aerial circuit the equivalent to an electrical blow. The aerial circuit in this case is coupled much more tightly than in the Marconi "jigger," as it was usel originally, because it is necessary

*From a recent lecture at Liverpool University.

clearly for the aerial circuit to take as much as possible of the energy of the primary oscillating circuit out of it before the current in the oscillating circuit ceases. This entails a somewhat different design of aerial circuit, since, if the aerial is a very good radiator and is started oscillating by a blow, the oscillation, and therefore the electric waves will rapidly die down.

Size of Plant.

The size of plant that is necessary depends, of course, entirely on the distance to be covered. As will be seen later, there is an enormous difference between the distance over which signals can be sent under varying conditions, the distance being much greater by night than by day, for example, and it varies with other things as well. Very approximately, the amount of power required to cover any distance is proportional to the square of the distance or, stated in another way, the distance covered is proportional to the square root of the power used. Another very important factor is the height at which the aerial can be placed above the sea level.

Ship's Lifeboat Installations.

Before concluding the description of sets suitable for "ship" work reference must be made to a new set that has just been designed for use in ship's lifeboats. The current is supplied by a small magneto machine which is hand-driven, so that the risk of the set being out of order is reduced to a minimum. The set is connected to an aerial supported on a hinged mast, or to a fine wire aerial attached to a kite. For a set having a primary power supply of about 100 watts operated by a magneto machine, and with aerials at a height of 23 feet, 20 feet and 14 feet respectively, the range is 25 miles, 22 miles, and 15 miles. With kites the ranges are much increased. With a height of aerial of 75 feet and 50 feet the ranges become 81 miles and 53 miles respectively. The kite-carried aerial is not very satisfactory, as the signals emitted from it are of varying strength, unless the kite is flying with great steadiness. Sets of this kind should be of great value for use on a ship's lifeboat sailing in unfrequented waters. As the disaster to the Volturno has shown, the number of ships on the Atlantic is so great that many ships can come to the assistance of a damaged vessel within a very short space of time.

Nature of Aerial Wave Train.

It is necessary to consider further the kind of wave train that is given out by an aerial. It is very desirable that the wave train shall be persistent and not of the "whip crack" type. The reason for the desirability of having a persistent train of waves, i.e., a wave train which consists, say of 50 or more oscillations, is that, with such a wave train, it is easy to tune the receiving circuit to the wave length that is being sent out. The increased signal strength due to the tuning of circuit depends on the heaping up of the effect of a series of small impulses if the transmitted wave train is not persistent, i.e., if the series of impulses consists of only two or three oscillations, then tuning will be of little use.

The greatest advantage that can be gained by tuning with a signal that consists, say, of two or three oscillations rapidly dying down, is about twice that which is obtained with the circuit wholly untuned, whereas if the train of waves consists of 40 or 50 oscillations, it is easy to make the received signal 30 or 40 times as strong as it would be if the circuits were wholly untuned. If tuning is to be of any use, therefore, it is essential that the wave train should be persistent. The circuits of a modern transmitter are designed to give a fairly persistent wave train of about 25 oscillations, though this number is greatly increased for a large station.

Directors of Electric Waves.

The effectiveness of a wave train can, however, only be accurately judged in conjunction with the type of receiving apparatus that is used to detect it at the receiving station. Of this apparatus there are two main types, the magnetic detector and the crystal detector. The first used by the Marconi Company has the advantage of great simplicity and robustness. It consists of a band of iron wires magnetized by a magnet and then passed through a coil which is connected in circuit with the aerial. The magnetization of the wire is affected by the waves, and this induces a current through a telephone connected with a second coil.

There is nothing to go wrong with this detector, and it retains its sensitiveness under all sorts of conditions. The other type of detector for electric waves is the crystal. It is found that certain crystals possess the property of unilateral conductivity, and thus act as a non-return valve for the currents received in the aerial. If a telephone be connected in series with such a crystal across the condenser, a current will pass through the telephone and will produce a click, which will indicate the reception of the train of waves corresponding to a spark. In either of these detectors, then, there will be a minute current in a telephone every time a spark is produced at the sending end.

In most cases now, the number of sparks per second is definitely settled. In most of the Marconi stations a spark frequency of about 600 is used, as this has been found to produce a note in the telephone receiver which is not tiring to listen to; while, in the quench spark systems, a higher frequency is used, which gives greater sensitiveness, but is found more tiring.

Regulating the Wave Length.

In the regulation passed by the International Radio Telegraphic Congress, it was agreed that the wave length used for ship signaling should be fixed at either 300 metres or 600 metres, except in cases in which a ship wished to communicate with another ship which was not the nearest to it, when another wave length might be used to prevent interference. Normally, a ship must be kept tuned for a known wave length, and that this is necessary is obvious when one considers that the ship may wish to communicate with any other vessel in its vicinity. One of the obvious results of such an arrangement, especially in a busy port like Liverpool, is that a great many messages may be coming in at the same time to a receiving station, and what is technically known as "jamming" takes place.

In order to obviate this result, and to make one set of signals easily readable over another (possibly to enable two sets of signals to be received at the same time), secondary tuning may be used with advantage. An obvious way of doing this is to use a receiving telephone in which the diaphragm is male of such dimensions that it vibrates at a certain frequency, which corresponds with the note of the spark that is being received. I have recently had the opportunity of testing a new piece of apparatus in which the same thing is done electrically, i.e., in which the receiving circuit is electrically tuned to the spark frequency as well as being tuned to the received wave length. This apparatus, which has been called the harmonic selector, may prove a valuable addition to the equipment of a ship's telegraph station, if the spark frequency used on board ship is varied to give different notes. An arrangement of this kind has already been used in connection with the wireless system operated by the navy.

Wireless Station Relay.

Before leaving the subject of the apparatus used in connection with ship signaling I may refer to one point which has often been discussed, that is the possibility of using a relay on a wireless station which will operate a call bell, and so avoid the necessity for an operator always listening to hear distress signals. Two pieces of apparatus of this kind have been designed and constructed by the Telefunken Company; one known as a "tone intensifier," and the other as a "call signal apparatus."

The former works on the same principle as the magnifying telephones used

many years ago, by Sir Oliver Lodge. The signal first operates a relay which controls a microphone. This microphone operates a second tuned relay which controls in turn a third relay and so on until, in the end, the relay is large enough to close a circuit which will ring a bell.

There are two difficulties in connection with a piece of apparatus of this kind: the first and greatest is the extremely small amount of electrical power available for operating the relay. Austin, who has made many measurements on this point, calculates that there would be available with a strong signal a current of 50 micro-amperos through a resistance of 25 micro-amperos, representing a power of about 62.5 thousand millionths of a watt, about one ten thousand millionths of a horse-power. It is possible to make relays, which will work with this small amount of power, but it is extremely difficult to make them reliable and serviceable under ordinary ship conditions, and unless such a relay is thoroughly reliable it is worse than useless.

It seems doubtful whether it will ever be possible to make a relay which will be absolutely reliable and which will work with this very small amount of power and stand rough usage, but after what has been done it is difficult to say that the task is impossible. It is easy to see, however, that the problem is an extremely difficult one. Further, it is necessary to make such a receiver respond only to the desired signals. This is a much easier task, though under certain conditions there may be trouble due to what are known as atmospherics. Anyone listening in to a wireless receiver hears a number of cracks or rattles called x's; these, in all probability being due to lightning discharges in the higher regions of the atmosphere. These x's are easily distinguished from signals by an operator, but a sensitive relay might easily be disturbed by them.

The Wireless Compass.

There is one application of wireless telegraphy at sea which I must refer to, although it has not yet been used very extensively, that for determining a ship's position in relation to certain known sending stations. Two schemes have been proposed. The first, known as the Bellini-Tosi System, is to have an arrangement of aerials on the ship, which will enable the direction from which signals are coming to be found. The form of directive aerial used is a triangular one. Two thin wires are supported by a mast, and stayed one to the forward end of the ship on the starboard side, and the other behind the mast on the port side. The wires are then brought horizontally to the receiving cabin at the foot of the mast, which contains the radio gomometer. Such an aerial receives signals much more strongly when they are coming from a direction in the plane of the aerial.

The lecturer described at length variation in signal strength and the atmospheric phenomena observed with regard to wireless, and he concluded with the remark that "Bearing in mind the widely varying weather conditions under which a wireless station on a ship has to operate, wireless telegraphy provides a means of communication, which, besides being wonderfully efficient, is also wonderfully sure."

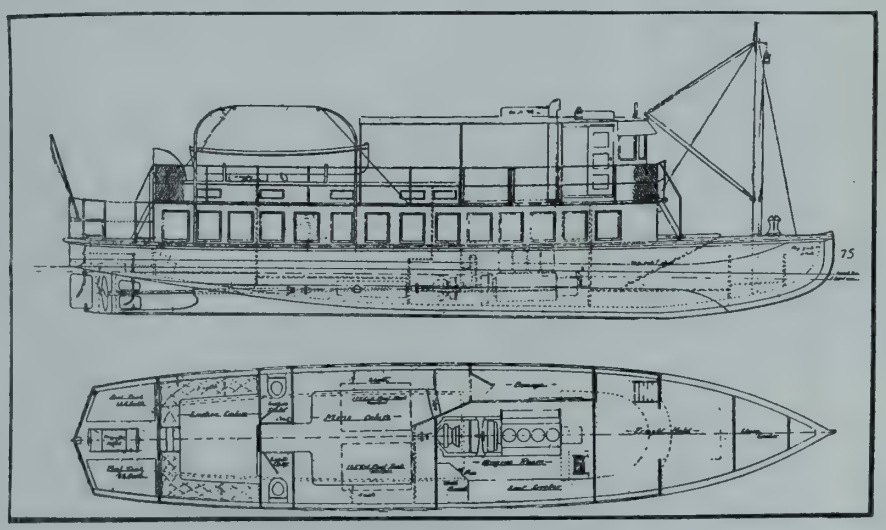
BRITISH MOTOR ENGINES IN CANADA.

PRACTICALLY all the British engines that have been imported into the Dominion of Canada during 1913, says the Motor Ship and Motor Boat, have been of the paraffin-petrol, paraffin, or heavy oil types, and many of them were of fairly high power, which is a good indication of the type of motor likely to find favor. There is at present little chance of Great Britain being able to compete to any great extent with makers of cheap petrol motors, although, of course, there is always a certain demand for high-class English goods. It is the increase in cost of the light fuel that has caused the demand for paraffin and oil engines, particularly for commercial craft. Every attempt is now being made to study and to meet this movement in the U.S.A., but so far without real success, due to the lack of what may be termed "real experience," for the successful use of paraffin is by no means the simple problem that it is generally regarded. However, no delay should be allowed to occur by British manufacturers, who already have had the necessary experience, otherwise America will again come to the fore.

It is a serious matter to realize that last year America supplied just 125 times as many motors to Canada as did the British Isles. The opportunity to secure the small marine petrol motor trade was lost some few years ago, but now another excellent chance has arisen, and it is to be hoped that immediate steps will be taken by those concerned. It would seem advisable that the Society of Motor Manufacturers and Traders should make some strong attempt in this connection on behalf of the home and colonial industry. There is good business to be had, and plenty of it, but it will not come easily.

British Motor and Boat Show.

We put forward as a suggestion that a show entirely devoted to the exhibits of British marine motor and boat builders, and accessory manufacturers, should be held in Toronto or Montreal, and to this we think the entire support of the Canadian press would be given, and certainly our own. This would give Canada an opportunity to see the manner in which marine goods are turned out in England, and it is quite probable that it would mean the turning-point of the market in favor of home products, and perhaps it would obtain for the United Kingdom a large share of the petrol-engine trade. Their initial expenses of exhibiting would, we are sure, be quickly covered, and all motors, etc., shown would command a ready sale before the termination of the show. It is not likely, however, that English-built hulls would command a popular sale, owing to the cost of transportation rendering the prices high; but this does not apply to engine sets and accessories.



75 H.P. PARAFFIN ENGINED PASSENGER CRAFT.

C. G. Vessel "Fort Langley."

About nine months ago a four-cylinder 75 b.h.p. Gardner paraffin engine set of the four-stroke type was shipped to New Westminster, and this motor has been installed in a new passenger vessel, built

at the B.C. Marine Railways yard, for service on the Fraser River between the Royal City and the upper reaches of the waterway. Also quite recently we described a Gardner-engined vessel built for the Canadian Government. "Fort Langley," as the passenger boat is named, is of the very moderate draught type, owing to the requirements of the navigation; she carries both passengers and cargo, and was placed in service last summer. Her length is 60 ft. overall by 12½ ft. beam, with 3½ draught, and the Gardner engine gives her a speed of 12 miles an hour.

When designing this vessel several important considerations had to be taken into account, including the swift current of the river and the fact that mud-bank landings for her passengers have to be made. It will be realized that the shape of the bows facilitates the latter operation. It will also be noticed that the hull is completely decked in and that deck-housing occupies at least three-quarters of her length, with a flush deck forward, under which are the cargo hold and chain locker, admittance being by a hatchway. Over the deck-house is a large promenade and seating for the passengers except at the forward end, where there is an enclosed wheel-house. In davits on the deck-house is carried a 14 ft. by 4 ft. by 1½ ft. rowing boat.

In the forward part of the deck housing is arranged the engine-room, with a passage on the port side leading to a small well forward, from which there is a stairway to the pilot-house. Communication between the pilot-house and engine-room when the boat is in operation is by telegraph of the usual ship's type. In the engine-room is a work-bench, also a locker seat. Aft of this compartment is the crew's cabin, under the floor of which are two fuel tanks, holding 250 gallons of oil. Aft again is a ladies' lavatory to the port side, and gentlemen's lavatory opposite. Next comes a large ladies' cabin, then the after deck, under which are two more 125-gallon fuel tanks.

N.T.R. CAR FERRY STEAMER "LEONARD."

THE Canadian car-ferry and ice-breaking steamer, built by Cammell Laird, of Birkenhead, for the National Trans-Continental Railway of Canada, was launched on Saturday, January 17. She is intended for service on the River St. Lawrence, between Quebec and Levis. Her principal dimensions are: length, 326 ft.; beam, 65 ft.; with a draught of about 15 ft. The propelling machinery consists of two sets of triple-expansion condensing engines. An ice propeller of nickel steel, driven by a compound-condensing engine, is fitted at the forward end.

The vessel is arranged for the carriage of passenger and freight trains at all seasons of the year. The trains are carried on a tidal deck arranged above the main deck—there being three tracks side by side, the length of each being about 272 ft. This tidal deck rests on castings working up and down on ten vertical lifting screws on each side, supported on columns, the columns being stayed by lattice buttresses against longitudinal transverse thrusts. The lifting-screws are hung on ball-bearings from the top, and are manipulated by means of worm-wheels driven from horizontal shafting which runs the length of the vessel on each side. The horizontal shafting is worked by bevel-gearing from a four-cylinder high-pressure engine of special design, situated below the main deck.

The gearing is arranged to lift the tidal deck fully loaded with a train and locomotive weighing about 1,400 tons, at a rate of 1 ft. per minute, to a height of about 20 ft., which enables the ferry to be loaded or unloaded at any state of tide. At each end of the tidal deck an adjustable hinged gangway is suspended, which allows for any change of trim or heel of ship due to unequal distribution of weights while taking the coaches, etc., on or off the vessel. Above the highest position of carriages on the tidal deck, a promenade is arranged all round the vessel, with a navigating bridge forward. The boiler-rooms are arranged in wing compartments amid-ships, with the coal-bunkers and the tidal-deck engine-room between them.

The main propelling engines are situated abaft the boiler rooms, and the engine for the ice propeller is placed in the hold just abaft the fore peak bulkhead. The vessel is fitted with electric light throughout, and electric gear is provided for raising and lowering the end gangways and for hauling the railway carriages on or off. Special arrangements are made for heating the carriages during transit. Double windlasses are fitted, one on each side with slip drum for mooring. Accommodation is arranged on flats below the main deck forward on both sides of ship for officers and crew.

NATIONAL TRANSCONTINENTAL RAILWAY TRAIN FERRY STEAMSHIP "LEONARD."

OFFICERS AND SEAMEN REWARDED.

A LARGE and representative gathering of shipping people at the Liverpool Town Hall, on Jan. 29, witnessed the presentation to Commander Dow, two officers and several members of the crew of the Lusitania of mementoes and money gifts for participation in the rescue of the Mayflower's crew on the Atlantic recently. The Lusitania's passengers raised the sum of $1,955 to recompense the crew of the Mayflower and provide reward for the rescuers, of which $640 was distributed among the former.

The Lord Mayor made the following presentation provided from the balance:—Commander Dow, an illuminated address: Lieutenant R. C. Alexander and Sub-Lieutenant D. F. W. Foden, gold watches; two boatswains and mates $125 each; seven seamen $80 each. The above nine men and two officers comprised the volunteer crew of the lifeboat. The Lord Mayor was accompanied on the platform by A. A. Booth, Chairman of the Cunard Line; Mr. Mearns, general manager, and other leading officials. The Lord Mayor spoke warmly of the courage and skill shown by the officers and crew of the Lusitania.

Commander Dow, in acknowledging the gifts, said that they did their duty for the sake of humanity without thought of reward.

Port Arthur, Ont.—The large bulk freighter, which is now being built at the Western Dry Dock and Shipbuilding Co. plant, will be ready for launching about April 1st. The vessel is all plated up to the spar deck.

NEW BRITISH SHIPYARD AT VANCOUVER.

ON the last day of 1913, says "The Engineer," the holdings of the British Columbia Marine Railway Co. at Esquimalt were transferred to Yarrow & Co., Limited, of Scotstoun, Glasgow. The former company was founded in 1893 by W. Fitzherbert Bullen, and the site occupied by the works and its other holdings, which are on the southern shore of Esquimalt Harbor, is eight acres in extent. The equipment installed includes a marine railway slip capable of docking vessels up to 200 feet in length, boiler, smiths', machine, electrical, and joiners' shops, and all facilities are possessed which are required for the building and repairing the ships.

When the works were originally laid down, the slip was the first of the Crandall type to be built on the Pacific Coast. At first, most of the work coming to the establishment had to do with wooden sailing ships. Then came in succession steel sailing vessels, steam tramps, and steam liners, and for all these the company had to rearrange its equipment so as to keep abreast of requirements. In 1895 it was found necessary to open a branch in Vancouver, which is still in successful operation. In 1898, the firm made its first essay in shipbuilding, and since that time it has produced numerous vessels varying in size from small wooden tugs to ocean-going steel steamships, some of these being for the Canadian Pacific Railway and some for the marine service of the Dominion Government. Among the most noteworthy of the repair jobs it has executed have been in connection with H.M.S. Amphion, Flora and Warspite. In busy times the firm has employed from 400 to 600 men.

The site acquired by Messrs. Yarrow is situated between what is known as Foster's Pier and Constance Cove, and a circumstance which we believe was largely instrumental in deciding its purchasers to take it over is that, closely adjoining, the Federal Government is about to construct at Langs Cove the largest dry dock on the Pacific Coast, and, indeed, one of the largest docks in the world, seeing that it is to be 1,150 feet in length. The purchase price has not been publicly declared, but it is believed that it was approximately $1,000,000.

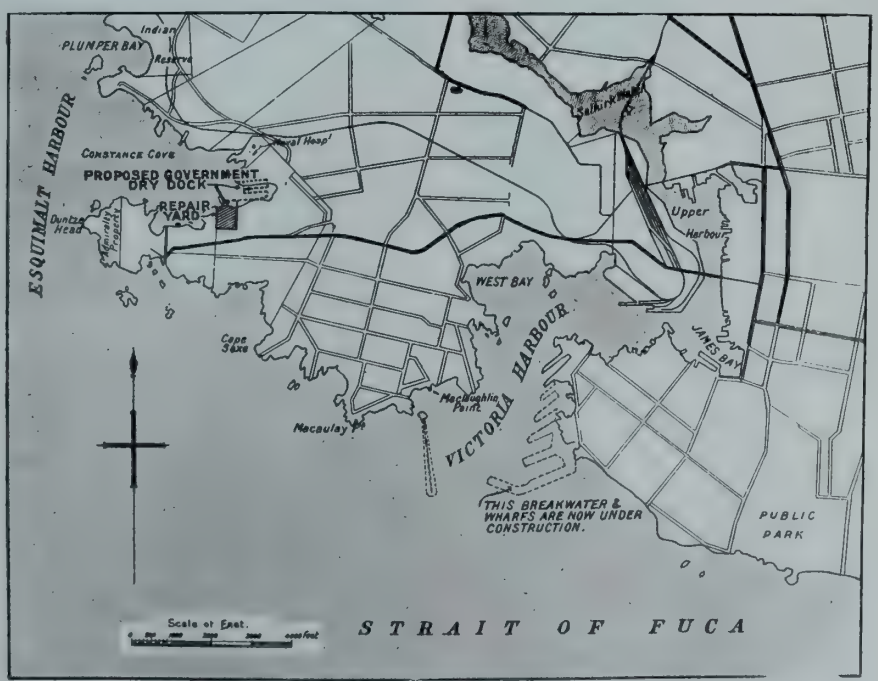
Mr. A. F. Yarrow has, it may be stated, been engaged for some months now in inspecting numerous sites on the Pacific Coast from Northern British Columbia to the Mexican border, and it is considered locally to be conclusive testimony to the special advantages possessed by Esquimalt that he has decided to make that place the site of a shipbuilding works which he proposes to develop. The Daily Colonist, as the result of an interview with Mr. Yarrow, gave publicity recently to the following details:—

The enterprise is to be turned into a company with the title of Yarrows, Limited, and though it will keep in intimate touch with the parent company on the Clyde, both undertakings will be conducted separately. Mr. Keay, one of the oldest and most able members of the Scotstoun staff, is to remain on the spot in charge for the next three years, after which Mr. Norman Yarrow and Mr. Izard will carry on the business. The present idea is, first of all, to undertake such repairs to ships and machinery as may come in the way of the firm, and at the same time to be willing to build vessels for the Canadian navy, such as fast torpedo-boat destroyers and light cruisers, of which the home firm has had such a notable experience. It is understood that the policy of the old company in making its charges reasonable and not to take advantage of its position as being at the first port on the Pacific Coast of Canada where repairs can be carried out, will be continued.

Canadian Shipbuilding Promotion.

It is of interest to note Mr. Yarrow's views regarding the present duties imposed on shipbuilding material imported into Canada. For this purpose we quote verbatim from the journal above mentioned, which reports Mr. Yarrow as saying:—

"As for the promotion of shipbuilding in Canada generally, it is impossible under existing conditions. The opening of the Panama Canal will make it still



MAP SHOWING SITE OF YARROW'S NEW WORKS AT ESQUIMALT, B.C.

more difficult, because it will cheapen the navigation of vessels which have now to circle the Horn. To inflict upon the shipbuilding industry on the Pacific Coast duties on the importation of material when the vessel fully built can come in free of duty is surely the very best means of strangling such an industry, which under existing circumstances cannot be developed here. It is well known that in commencing an industry it is necessary to foster it. The only possible way of developing shipbuilding on the Pacific Coast of Canada is to abandon the duties now in operation and to have a bounty, based preferably on the value of the vessel and not on the tonnage.

"Having studied the subject, I have came to the conclusion that a bounty of not less than 30 per cent. of the value of the vessel for the first five years would be necessary; for the next five years, 25 per cent.; for the next five years, 20 per cent., and for the next five years, 15 per cent., and after that time the needs of the shipbuilding industry will depend upon the development of the natural resources of the country. Of course, no industry like shipbuilding can be developed quickly.

"As a Finance Minister does not want to be faced with an unlimited liability, I suggest that bounty payable should be limited to a suitable total amount. As it is now, the duty upon imported material for shipbuilding seems to be of no possible use. It brings no revenue to the country, because little or no shipbuilding is carried on, and if it be supposed to encourage the trade it certainly has failed in that. The present policy appears to serve no useful purpose. Having in view that there is the reasonable possibility of the Pacific within the next fifty years emulating the present conditions of the Atlantic in regard to the number of ships navigating it, it seems that an opportunity for enriching the country and promoting enterprises will be lost unless shipbuilding is encouraged. Manufacturing industries are what the country urgently requires, being totally dependent now upon its natural resources. There can be no doubt, however, that, subject to proper conditions, shipbuilding can be fostered on the Pacific Coast of Canada."

NEW GERMAN CANAL TAKES LARGEST SHIPS.

EMPEROR William expects to open the enlarged waterway connecting the Baltic and North Seas probably in April. The work of improvement, which has cost more than the building of the original canal in 1887, will enable the passage of the biggest battleships.

Such world-wide attention has been directed to the Panama Canal that it is scarcely realized that the German engineers have been building locks even bigger than those at Panama. American battleships now under construction can barely squeeze through the Gatun locks, and the 45,000-ton Superdreadnought, which is already in sight, will have to follow the path of the Oregon around Cape Horn to get from the Atlantic to the Pacific coast. The German canal will have locks 82 feet longer, 37½ feet broader, and of four feet greater draught than those of Panama, and will accommodate a 60,000-ton battleship, should naval designers go as high as that in the future. There is room and two hundred feet to spare in them for the newest and biggest ocean liners of the Imperator and Aquitania class, so that ample provision has been made for possible developments of commercial navigation as well.

The Old Canal.

The existing canal was opened in 1895. It runs from Kiel on the Baltic to Brunsbuttel on the Elbe estuary, a short distance from the sea, and cuts off the long and rather hazardous passage through the Cattegat and around the northern end of Denmark. It jumped into importance immediately as a maritime highway, and was used by about 20,000 vessels during its first year. The traffic steadily grew, the canal being traversed in 1912 by 57,366 ships of 9,924,237 total net tons, a traffic larger than that of the Suez Canal.

To the German navy it was of inestimable advantage, enabling a commander to throw the entire fleet from one sea to the other in a few hours, and to menace, for example, an opposing British fleet from points several hundred miles apart. With the advent of Dreadnoughts, however, this advantage was lost, as the old locks were too small to accommodate the naval monsters, and it was determined to provide larger locks and double the width of the canal.

The Big New Locks.

The new locks, which lack the imposing height of those at Panama, but are bigger in every other respect, are 1,082 feet long (Panama, 1,000 feet), 147½ feet wide (Panama, 110 feet), and have a mean depth of 45 feet of water (41 feet) over the sills. The new canal is 400 feet wide at the surface, 150 feet wide at the bottom of the excavation, and has been provided with eleven "sidings" at which vessels may pass. New harbors have been built at each end, several sharp curves have been eliminated, two new railway bridges 150 feet above the canal have been provided, and other details have brought the cost of the improvement up to $55,600,000, whereas the original canal cost was only $39,218,000. The enlargement involved the excavation of 140,000,000 cubic yards of earth; the original canal involving 112,000,000 cubic yards. The work, which has occupied five years, has been carried on without interrupting traffic in the canal, the new locks, one at each end of the canal having been built beside the old ones.

The Fortifications.

To protect the locks of the Panama Canal from bombardment and destruction by a hostile fleet they were placed several miles inland from the ends of the canals. In the Kaiser Wilhelm Canal the same result has been obtained by having the canal terminate at one end in Kiel Fiord, a long, narrow arm of the Baltic, and at the other in the Elbe River, some fifteen miles from its mouth. Both river and fiord are heavily fortified.

The new canal is about sixty miles long. Passenger steamers are allowed to proceed at 12½ miles an hour, while freights are held to a slower pace, so that the passage of the canal takes from five to thirteen hours. It shortens the trip from the Baltic Sea harbors to Hamburg by 480 miles, and to London by 269 miles.

HAMBURG-AMERICAN LINE AND CANADA.

IN accordance with the recent announcement of the Hamburg-American line that they would inaugurate a steamship service between continental Europe and Canada, making Halifax their winter and Montreal their summer port, an arrangement has been made with the Montreal harbor authorities for a lease of the Tarte pier.

Sailings Announced.

Henry F. Dorgeloh, who recently arrived in Montreal from San Francisco is in charge of the Canadian business of the line. The first sailing of the new service was the S.S. Armenia from Hamburg on February 7 for Halifax. Beginning March 3, a weekly service from Europe to Canada will be maintained, the Pallanza, Barcelona, Pisa, Bohemia, Armenia and Arcadia being the vessels placed on the service. The eastbound sailings have not yet been announced but will be shortly, it being the plan of the company to operate a regular east and westbound service to Canada hereafter.

Steerage Passengers Only.

The steamers will sail direct to and from Hamburg and will carry steerage passengers only. The intention is to have the steerage passengers landed at Quebec and to have the steamships then come to Montreal and dock at the Tarte pier for cargo.

NAVIGATION AIDS ON GREAT LAKES.

A COMPREHENSIVE system of navigation aids from Port Arthur to the St. Lawrence was recommended on February 5 by a deputation of the Shipmasters' Association of the Great Lakes, which waited on the Hon. J. D. Hazen, Minister of Marine and Fisheries. The deputation also protested against the appointment of a salt water man as wreck commissioner on the Great Lakes, and urged the advisability of the appointment of an experienced lakes master as wreck commissioner on all inland wrecks. The deputation was composed of W. S. Middleboro, M.P.; W. H. Bennett, M.P.; James Arthurs, M.P.; W. A. Smythe, M.P.; W. F. Nickle, M.P.; Col. Hugh Clark, M.P.; Charles Munson, M. P.; A. C. Boyce, M.P.; and Capt. Richard Simpson, of Owen Sound. With the Minister of Marine was Alex. Johnston, Deputy Minister, and J. G. McPhail, both members of the Lighthouse Board, also Capt. Lindsay, Wreck Commissioner.

Mr. Middleboro presented a memo of the proposed aids to navigation and a petition therefor signed by 85 captains on the inland lakes, and then introduced Capt. Simpson, of Owen Sound, who explained the necessity for the proposed aids. He also pointed out the advisability of appointing as wreck commissioner for the inland lakes a man thoroughly experienced in inland navigation.

The Minister advised the deputation that some aids which they had suggested had already been ordered by the Department, while many of the others pointed out seemed to be necessary, and that after an investigation the Department would endeavor to carry out such of these as their investigation warranted. He stated that he was disposed to do everything possible to assist the mariners in their hazardous occupation.

SHIPPING FEDERATION OF CANADA ANNUAL MEETING.

THE St. Lawrence ship channel level at low water has receded three feet during the past 25 years, and shows every sign of a further decrease, according to a report made by Arthur Surveyor, member of the International Association of Navigation Congress, who presented a report to the Shipping Federation of Canada at the annual meeting recently. Mr. Surveyor also stated that a 35-foot level in the channel could not be obtained by merely dredging the river bed. He gave three reasons for the subsidence of the water plane; these being the deforestation of the St. Lawrence basin, the enlargement by dredging of the controlling sections of the river, and the diversion of the waters of Lake Michigan by the Chicago canal.

In his presidential report, Mr. Andrew Allan traced the increase in shipping to and from Montreal port during the 1913 season. Eighty-four more ocean steamers had moored in the harbor than for the year previous, and grain shipments had increased by 15,351,388 bushels.

Pilotage Matters.

"After repeatedly impressing upon the Government the necessity of an enquiry into the pilotage conditions prevailing in Montreal and Quebec districts, I am pleased to be able to state that a Royal Commission was appointed early in the year, and conducted an extended and exhaustive enquiry," he said. "Owing to the report having been presented as the session was about to close, the Government was unable to introduce a measure dealing with those parts of the report that required legislative treatment, but they are under promise to introduce a bill in the coming session."

The general report of the Federation contains the following—"No regulations were in force during the season just closed (regarding the conduction of vessels within the limits of the harbor), and the Commissioners are apparently taking no interest in the matter. The by-law passed in 1912 was withdrawn after being in force for a few weeks only. It passes our understanding that such an important matter should be allowed to remain in so unsatisfactory a condition, and we take this opportunity of stating that the steamship companies can in no way be held responsible, as they have always urged on the Commissioners and on the Government the necessity of having regulations made and enforced."

Rentals Too High.

It was further declared that the present shed rentals in Montreal are nearly fifty per cent. more than the maximum proposed to be charged by the Commissioners when the scheme of improved shed accommodation was initiated. We have come to the conclusion that the only solution is for the Commissioners to lease the sheds for a period of years to the companies, as by so doing, the companies would have some inducement to install such appliances as are suitable to the handling of their respective classes of cargo.

"Master pilots of vessels navigating in parts of the harbor still complain of the difficulty and anxiety experienced in handling their ships in the current, and that during the season little improvement was discernible."

WHO'S WHO.

A. H. JEFFREY,
Manager and Secretary, Polson Iron Works, Ltd., Toronto.

C. P. R. LEASE OLD CUNARD BUILDING.

THERE is considerable historic significance in the circumstance that the C. P. R. has just taken for the winter months the old Cunard building, at Halifax, N.S., erected by the founder of the Cunard line—Mr. Samuel Cunard, who was a Halifax man and who made his name famous in the shipping and mercantile world. It was to Halifax that he brought his first ships, and it was in the old office he bent over his task.

There is a new day and new methods, and a degree of expansion of which he could not have dreamt. The shipping business has increased hundredfold during the last half century. The stress and strain of life are indicated by the speed demanded on land and sea—speed which the old founder could not have foreseen in his most prescient moment.

The old house (or offices) is a three-storey building of stone with the quaint old windows hinting a quiet and sedate world which minded its business and did not bother looking out at hobble skirts. The name is cut on the building—"S. Cunard"—offering a memento of the past full of interest, as suggesting at once the small beginnings of a great business to which he devoted his energy, and genius and the amazing development of that business, keeping pace with modern demand, by the C. P. R.

"COBEQUID" CAPTAIN CENSURED.

WRECK Commissioner Lindsay gave his judgment on Feb. 3, with regard to the inquiry into the wreck of the steamer Cobequid on Trinity Ledges, Bay of Fundy. The commissioner censures Captain Howson, but on the ac-

count of the manner in which everything was done for the safety of the passengers and crew, his certificate is not dealt with.

The wreck was due to a grave error in judgment by Captain Howson, inasmuch as two hours before the stranding and in the face of a heavy gale and thick weather he was not justified in attempting to pass within the shoal. Nor was he justified in assuming that because the lightship was not on her station when he sailed south a month previously, she was still out of position.

A MID-ATLANTIC RESCUE.

PARTICULARS have recently come to hand at the headquarters of the Imperial Merchant Service Guild, says the Journal of Commerce, of a rescue of the crew of the Norwegian barque Chala in mid-Atlantic on the 15th of last month. The rescue was effected by Mr. E. G. Enright, chief officer of the Royal Fleet auxiliary steamer Petroleum, under the command of Captain J. R. Williams, both of whom are members of that body.

It seems that the steamer Petroleum encountered terrific weather on the 13th and 14th of January, and it was only by the liberal distribution of oil that no serious damage was done by the high sea running. On the evening of the 15th, the Chala was sighted burning distress flares, and although the gale had somewhat abated a very heavy swell still prevailed, which made the handling of the ship a very difficult matter. Captain Williams at once bore down to the rescue, and, rounding close under the stern of the distressed vessel, on hailing her elicited the fact that their condition was a desperate one, as the ship had sustained very serious damage.

Captain Williams, although tempted to wait for daylight, decided that the rescue must take place at once, and with very great difficulty the cutter was got into the water, manned by Mr. E. G. Enright, chief officer, and six men. On approaching the wreck she was found to be rolling so heavily that it was impossible to get alongside, but by the exercise of skilful seamanship, great coolness, and daring on behalf of the chief officer and his boat's crew, communication was at last established between the boat and the wreck by means of lines, two of which were used to keep the boat in position, whilst the other was used to transfer the crew of the barque to the boat.

With great difficulty, the now overloaded boat was eventually got alongside of the steamer Petroleum, and her human freight was finally, thanks to the skilful handling of the ship, placed safely on board, the cutter having to be abandoned on account of her damaged state. It is understood that the Guild are making representations to the proper quarter with a view to the gallantry of their members being suitably recognized.

UNITED STATES SEAMEN'S BILL.

CONCERNING the La Follette, U.S. Seamen's Bill, the Shipping Federation of Canada has carefully considered the whole of this matter, and think that the reasons following show very clearly why the Bill should not be allowed to become law, in so far as it relates to foreign ships, and we are of opinion that it would be advisable to take up that positisn.

Deserters.

The enactment of a law to abolish the imprisonment of seamen for desertion in the United States ports, from foreign ships, will not conduce to the improvement of the discipline of these ships, but will be an inducement to the worst class of foreign seamen to desert, and their presence will be of no benefit to the people of the United States. To give an instance, suppose a seaman signs articles on a British ship, for a voyage from Liverpool to New York at £5.0.0 per month, he generally receives a half month's advance. That means when the ship arrives at New York, he is often in debt to the ship. If he knows he is not liable to be sent to prison for desertion, he deserts, and loafs around the wharves as long as he can bum booze, and a doss, and then perhaps works for a day or two, or ships for a short run. Why the United States Senate should trouble to legislate for such men is a problem, legislation being generally supposed to be for the benefit of the greatest number.

Advance of Wages to be Unlawful.

There is no reason why the United States Government, should interfere in the matter of advances, or allotments of wages to seamen, who sign articles to sail from ports of the United States on foreign ships. There has never been any complaint that the Consuls of foreign countries did not carry out their duties efficiently in connection with these matters.

Payment of Wages in the United States Ports.

This is a retrograde step, and will very seriously affect the discipline of foreign ships, by inducing the unsteady and disorderly members of the crew to demand the wages that should be taken home for the benefit of their wives and families. It will lead to drunkenness and brawling, and in the case of passenger steamers will be an element of danger through relaxing discipline. It is impossible to discipline seamen on the eve of sailing on these large ships, as all members of the crew are required at their respective stations, on the departure of a ship with a large number of strange people on board. It will also tend to an increase of those who miss their ships at the last moment.

Lifeboats and Life Saving.

That the assignment of a place in a lifeboat to each passenger on embarking might be easy enough to carry out, but the effect of such assignment in case of fire or accident would be disastrous, and would not be capable of enforcement. Passengers are all liable to sudden panics, and the assembling on the boat decks on a dark night of hundreds of passengers each looking for his or her boat, would lead to confusion. The manning of lifeboats by a class of so-called A.B.'s. and the neglecting of other ratings of the crew is entirely wrong. For instance, — considerable numbers of stokers after leaving the British Royal Navy join the Merchant Service, and those men who are all trained to handling boats, would be entirely lost for lifeboat purposes should this Bill pass. There are also hundreds of boys from training ships who join the Merchant Service, and who are all trained boat handlers before they go to sea, and would be infinitely superior to the article demanded as an A.B. of three years' service by the Bill. There is, therefore, not the slightest reason for restricting your qualified boat handlers, to certain classes of A.B.'s and neglecting other ratings.

W. F. Bullen and H. F. Bullen, who recently sold their shipbuilding plant to Yarrok & Co., were banqueted in Victoria last week.

Montreal, Que.—Tenders will shortly be awarded by the Canada Steamship Lines for two new steamships for the Bermuda trade at a cost of approximately $1,500,000. The Quebec Steamship Company, which forms part of the consolidation of which the Richelieu and Ontario was the nucleus, has for some years operated a service between New York and Bermuda, and the proposed addition will form part of this branch of the merger's activities.

L. L. Henderson, of the Montreal Transportation Co., Toronto, has been elected president of the Dominion Marine Association. The other officers are: First vice-president, A. E. Matthews, Toronto; second vice-president. H. W. Richardson, Kingston; Executive, George E. Fair, Collingwood; H. H. Gildersleeve, Sarnia; S. V. McLeod, Sault Ste. Marie; D. Murphy, Ottawa; J. N. Norcross, Toronto; F. S. Wiley, Port Arthur; A. A. Wright, Toronto; C. B. Harris, Toronto; H. W. Cowan, Toronto. Counsel, Francis King, Kingston.

Concerning the Combustion of Oil Fuel in Marine Boilers*

By J. S. Gander, M.I.M.E.

Oil fuel is becoming increasingly prominent in the sphere of marine engineering, both as a steam-raising medium and as a substitute for steam as the motive power of propelling machinery. In view of the fact that a large number of Canadian-owned vessels are already equipped with oil-burning apparatus, and that further installations are projected, the data herewith should be particularly interesting.

AT the present time there are many systems in vogue for the combustion of oil fuel in marine boilers, but in the merchant service we may divide these under three main headings:—Steam with oil; the direct pressure system; and the compressed air system. The steam with oil appears to have been the earliest successful method, although at the same date, in 1865, a very serviceable burner of the hot-air blast type was introduced into England. The direct pressure burner was patented at a much later date.

Bunkering.

In order that this paper may be of some practical value to those who have not yet acquired what we might call oil fuel experience, I shall commence at the first cycle of operations—bunkering—and endeavor to explain as we proceed the various important details and the precautions that must be observed in order to burn oil fuel successfully with any system. It will be seen later that it is of vital importance to have clean bunker spaces. The fuel bunkers of a vessel which has been undergoing repairs should be thoroughly cleaned out, and then examined by a responsible engineer before fuel is taken aboard.

It is a common practice to clean these spaces with sawdust and bagging, and workmen are apt to leave these materials in the bunkers, especially in the double bottoms. Should this item be neglected we may reasonably expect to throw heavier work on the filters, and consequently on the staff. Once these fuel spaces are cleaned in an efficient manner they may be expected to remain so, as the installations supplying the fuel take every care to extract any impurities, and, further, a filter box of a coarse mesh can be fitted in the filling line. Even with fuel containing impurities a system can be efficiently worked by attention to the filters, but the little labor involved in the cleaning of the tanks is one which is well repaid.

The operation of bunkering is a very simple matter, rapidity of loading depending on the size of pipe through which the bunkers are filled. The quantity can be accurately ascertained in a few minutes by measurement with a tape line, but usually drawings are provided giving the bunker capacities per foot depth. In any case it is an easy matter to graduate a tank by arranging with the installation supplying the fuel to run up ten tons at a time and by taking note of the ullages in each instance.

Measurements taken in this manner are often found more reliable than builders' figures. After loading, the water finding test may be applied to the first tank loaded, and if any water be present, a few inches or so from the bottom, the tank should be pumped into a settling tank where the water may be readily separated by means of the heating coils, and drawn off.

The Direct Pressure System.

With the invention of Korting's burner, many years ago, began the era of the direct pressure burner. Shortly after a successful direct pressure system was invented by Mr. R. A. Meyer, and was installed in the vessels of the Koninklijke Paketvaart Maatschappej, of which company Mr. Meyer was at that time the superintendent engineer. The direct pressure system is so called because the fuel is injected into the furnace by pressure from a fuel pump through a burner which is pierced at the end by a very minute hole. The fuel is heated and filtered before it arrives at the burner.

As in the steam with oil system the same precautions must be observed with regard to cleanliness of bunkers before loading and elimination of possible water afterwards. The oil being fed from pumps, there is no need for a gravitation tank, but a tank should be supplied for the separation of water from the oil—this is not an absolute necessity, but a decided advantage. The pumps controlling the fuel pressure and supply are situated in the engine-room convenient to the front platform. These pumps, of which only one is worked at a time, draw the oil direct from the bunkers or the separation tanks through a suction heater, and discharge through a delivery heater and filter to the burners.

The Meyer System.

With the Meyer system, which is probably the most up-to-date and economical direct pressure system, the filters and heaters are in duplicate, and are arranged to run separately or in couple as desired. It is advisable to change over the pumps every week, just as would be done in the case of any duplicate pump to keep both in thorough working order. Suction and pressure gauges are fitted to the pumps, and a large air vessel maintains regularity of pressure. Steam for the heaters is supplied from exhaust of the pumps or direct from the auxiliary steam line, and the exhaust from the heater may pass through a separate coil in the main condenser or through a small auxiliary condenser circulated from the main pumps.

The condenser water is led to an open tank divided into separation compartments, so that, in the event of any oil being present in the water, it is not possible for such oil to enter the feed supply. Leaving this tank, the water is led to the main feed tank. The filters for an installation of this type are about 4 feet in length—a brass frame covered with copper gauze of about 30 mesh. Under normal conditions the filters may be safely run for a fortnight before changing over to the duplicate. The heater coils should be cleaned every three months, and more often if water has been present in the oil, as this tends to form a slight scale at the bottom of the coils which reduces their heating effect. The construction of heaters and filters is such that the operations of examination and cleaning are easily and quickly effected. The heaters should be fitted with small drain cocks, as it is in this part of the system that we can thoroughly eliminate any trace of water in the fuel.

The Meyer-Smith System.

The direct pressure system on the Meyer principle has quite recently been greatly improved. Formerly, the furnace fronts were of the heavy cast iron type, and were somewhat cumbersome when changing from coal to oil or vice versa. These are now made of sheet steel of an improved design, with the result that the operation of changing over is greatly simplified. The new type embodies all the advantages of the old, the incoming air is heated, and has a rotary motion imparted to it by the retarding vanes.

With the new system, or the Meyer-Smith system as it appears to be called, certain changes have been made in the construction of the burner. The needle was not adjustable in the old type, the quantity of oil passing depending entirely on the diameter of the orifice and the fuel pressure. With the latest type of burner, an external thread is cut on

*From a paper read recently before the Institute of Marine Engineers.

the triple thread at the end of the needle, and by turning the small hand-wheel, which is fitted to the other extremity, the needle may be advanced toward or withdrawn from the orifice. This operation alters the shape of the spray. Once the correct shape is struck, a matter of a few seconds, the needle is left in that position.

An important addition also to this burner is the small filter which fits over the needle and arrests any impurities which may have passed the main filters. With the Meyer-Smith system the furnace brickwork is dispensed with. The only brickwork used is the back-end wall at the neck of the furnace which limits the area of the opening to the combustion chamber and protects the adjacent seams, and the usual wall around the combustion chamber to cover stay nuts and seams.

Comparing the Meyer with the Meyer-Smith system, the latter possesses the following advantages:—

Quicker handling of the furnace fronts in changing from coal to oil.

Improved rotary motion imparted to the fires.

Dampers more convenient of adjustment.

Cheaper first cost and renewals (according to makers' claims).

The oil fuel may be burnt with the ordinary coal fittings in position, with forced or natural draught on the Zulver system. This method was introduced by Mr. C. Zulver, the author of a recent paper on "Liquid Fuel as a Source of Energy for the Propulsion of Ships and its Proved Advantages over Coal." Mr. Zulver has installed this system in some of the vessels under his superintendence with remarkably economical results. The burners used are of the ordinary Korting or Meyer type, but are somewhat longer for forced than for natural draught in order to bring the orifice of the burner to the correct position with regard to the furnace mouth.

A further point in favor of this system is the fact that the same heating area is used for coal as for oil burning, and it is especially suitable for boilers with furnaces of large diameter where some difficulty might be experienced in getting the whole area of the furnace to act as a heating surface. Although the heat may be said to be to some extent local, yet it is, to coin a paradoxical term, locally distributed.

Smoke Questions.

When burning oil with forced draught, the fan should be run as low as possible consistent with good combusiton, otherwise heat is being blown up the funnel. With forced draught as with any other fuel system it is always possible to run without smoke. It is good practice to obtain a slight smoke at the funnel with both the steam and the forced draught systems. In the first case, we are not wasting steam, and in the second, not using too much draught. A water column of 5/8 to 3/4 in. in the ashpit gives good results, but each vessel has its own peculiarities, and the best pressure must be obtained by trial. The usual fuel pump pressure would be from 35 to 45 lbs., depending on the fuel. The fire bars are bricked over with the exception of a strip at the front end through which the draught passes upwards from the ashpit. The addition of a small retarding block placed about 2 feet from the furnace neck effects a slight economy in some cases. Observation mica discs enable the state of the fire to be examined without losing draught. A small door is fitted to the furnace door to allow of the insertion of the carbon slice. As there is no occasion to open the fire door, it is made air-tight with asbestos putty and clamped up. The burners are asbestos packed where they enter the doors, and cleaning is easily effected by means of the plug at the back without removing the burners from the doors.

As in all forced draught jobs, the vertical air heating tubes should be periodically examined and cleaned. In an oil burning vessel there is sometimes a tendency to allow smoke tubes to run a considerable time before sweeping. Although the quantity of soot found after a long run is very minute when compared to that which may be expected from a coal burning job, yet, as the insulating properties of oil soot appear to be slightly greater than those of coal soot, it is good practice to clean the tubes once a month.

With the direct pressure system of the Meyer type, when no steam is available for starting fuel pumps, it is necessary to inject the fuel at the commencement with a small hand pump—usually a hand lever is fitted to the motion arm of the ordinary fuel pump—and the oil passes through a coil heated by a kerosene blow-lamp or burner. This very seldom happens, as, in the case of all fires being out of action, shore steam or compressed air is generally supplied to carry on the ordinary work of the engine-room. With the steam-with-oil system, and no steam or compressed air from external sources available for starting, the oil is sprayed on to a small wood fire inside the furnace by the force of its own gravitation. In this respect the direct pressure system is preferable.

When raising the temperature of the fuel oil on direct pressure systems, the exhaust valve of the heating coils should not be opened too much if it is required to heat the oil to a high degree. If the valve be almost shut down the pressure in the coils will be nearly the same as the initial supply with a correspondingly high temperature, and the heating effect can then be regulated by the amount of opening of the steam valve. On the other hand, if the exhaust be too much open, the pressure in the coils will be nearly the same as that of the exhaust line, or almost atmospheric, with a temperature which will not serve to heat the oil beyond 200 deg. Fahr.

Cold Climate Feature.

In extremely cold climates and with heavy grade fuel, a little difficulty may arise owing to the thickening of the fuel interfering with the working of the pump. This is provided against by the addition of a small heating coil to each of the suctions in the bunkers, so that, when occasion arises, a little steam may be passed through, which has the effect of raising the temperature of the surrounding oil. The previous remarks with reference to cleanliness of bunkers, separation of water, and efficient filtrations, apply to all modern oil burning system as well as to the steam with oil system, under which heading they were included. The steam burner and other similar types having a large opening for fuel with a low velocity are much less sensitive to the presence of water or impurities.

Supposed Risk.

Much has been said at various times with regard to the supposed risk attending the consumption of oil fuel in marine boilers, and, although it is recognized in these days that oil fuel is a perfectly safe factor for the generation of steam, the safeguards against possible accidents are very thorough. Among these are the following:—

(a) Ash cocks are fitted with lengthening rods so that they may be operated from the deck or the stokehold.

(b) Sand boxes are provided in each stokehold.

(c) Water hose are in readiness in prominent positions.

(d) The steam supply to fuel pumps can be shut from the deck or below.

(e) Regular inspection and the washing of stokehold plates each watch.

Experiments show that water is infinitely more effective than any other practicable agent in the quenching of burning oil fuel. It immediately lowers the temperature, with the result that the fuel can no longer burn. In an experience of five years of continuous oil fuel burning, the writer has not seen a fire occur: it is simply a matter of the observance of ordinary precautions. Comparing the steam with oil and the direct pressure system, the advantages are greatly in favor of the latter, especially for marine purposes. Although the steam system is very simple and easily worked by firemen of average intelligence, and the cost of installation must be comparatively small, yet the direct pressure system is

far more economical of fuel. Of direct pressure systems the Meyer-Smith, by reason of the recent improvements which have been mentioned, appears to hold the foremost place for economy and convenience.

Oil Fuel Advantages.

Speaking from the practical standpoint of the marine engineer the following advantages are obtained from the use of oil fuel:—

(a) The quantity of bunkers received can be accurately ascertained very quickly. Tallying while taking bunkers no longer necessary. No trimming.

(b) No cleaning of fires required—therefore, no currents of cold air enter the furnace which may cause damage.

(c) Full and regular steam can be maintained without any trouble in all climates.

(d) Steam is under perfect control. On receiving an order by telegraph the engineer can increase or decrease the steam supply to the fuel pump without leaving the engine-room.

(e) More perfect combustion with oil than with coal—hence greater calorific efficiency.

(f) The engineer, if necessary, is independent of his firemen.

(g) The boiler tops, bilges and all engine-room and stokehold spaces can be kept in an absolutely clean condition, and there is no smoke or fumes to discolor paintwork or ashes to choke bilges.

(h) Combustion not affected by heavy weather. At times when coal firing might become impossible, the oil burning vessel can carry on as under normal conditions, and the bilges are always clear in the event of a washout.

(i) If worked in an intelligent manner, oil fuel is practically smokeless.

Comparing the systems, it is apparent that the most economical appears to be the Zulver system, with forced draught so far as practical and reliable data are obtainable at the present moment. Reliable data with reference to the latest Meyer-Smith system have not yet been formulated, but, so far as we have been able to observe there is a decided economy over the older type of furnace front, although the advantages of the new pattern are not yet so apparent in some vessels as might be expected.

Actual practice shows that far less boiler trouble may be expected with oil than with coal. Perhaps the most frequent source of leaky tubes in boilers is the constant necessity for cleaning fires when coal burning and currents of cold air pass to the back ends. The only cleaning necessary with an oil system is the occasional removal of small quantities of carbon. This operation is performed through a small hand hole large enough to admit the slice. The furnaces are more evenly strained, especially with the systems where the whole of the furnace acts as a heating surface, and it is reasonable to suppose that the circulation is more efficient for the same reason.

The fact that the tubes are always more or less clean, and there is, therefore, no occasion to sweep them at sea, tends to give that part of the boiler a longer lease of life. As there are no sharp temperature differences at any part of the furnaces there is no pitting and corrosion. Collision chocks are eaten away by acids formed in damping ashes as when cleaning coal fires. No paper dealing with direct pressure systems would be complete without a reference to the White mechanical oil system and the Wallsend patent liquid fuel burning system. These systems are, however, similar in principle to Meyers, but vary in the details of construction.

WIRELESS STATIONS ESTABLISHED.

OF the 3,500 coast and shipboard wireless stations existing in June last, according to the International Berne list, England owned 138 and 1,062, and Germany 110 and 522, or together 53.9 per cent. of the total. The foundation of the Debeg Drahtlose Telegraphie in 1910 tended greatly to enhance the German figures, the installations of that company on German ships having advanced from 26 in the year named to 355 in the current year.

The most important installation made by the company is that on the S.S. Imperator. A greatly-augmented machinery equipment, to minimize the risks of a breakdown, an increased staff—three skilled telegraphists—with five rooms for their working and accommodation, and threefold antenna installations, fitted to more than one mast, with an independent minor installation for subsidiary services, are among the features of the improvements, while the ranges of the sending instruments are:—(1) 1,500 kiloms. to 3.000 kiloms; (2) 600 kiloms. to 1.200 kiloms; and (3) the "Help" call 200 kiloms. to 400 kiloms.

GREAT LAKES DISASTER FUND.

THE committee in charge of the Lakes Disaster Fund of Canada will meet next Monday afternoon, Feb. 23, at the office of Mr. Mark H. Irish, 607 Traders Bank building, Toronto, for the purpose of taking final action with regard to the appropriations to the beneficiaries of the fund, which amounts to $110,834.

If the plan now proposed is adopted, $77,460 will be divided among forty-five beneficiaries in monthly instalments spread over five years, and $2,300 will be distributed among ten people immediately, while ten cases pending investigation are to receive an average of $1,721, in payments spread over a term of five years.

The following is the list of the relatives of the Canadians who perished in the great lakes storm of last November, together with the particulars of the benefits they are to receive per month and the total amount to be paid to them during the next five years:

	Monthly Benefit.	Total Benefit.
Mrs. Charles F. Baker, Collingwood	$65.00	$3,900.00
Mrs. James Scott, Collingwood	55.83	3,349.80
Mrs. George McGillivray, Collingwood	17.60	1,056.00
Mrs. Wm. R. Sheffield, Collingwood	32.50	1,950.00
Mrs. F. B. Cameron, Collingwood	65.00	3,900.00
Mrs. Annie Brooks, Collingwood	25.00	1,500.00
Mrs. Mary E. Gordon, Collingwood	16.57	994.20
Mrs. Sarah L. Barrett, Collingwood	16.57	994.20
Mrs. Whitelaw, Falkirk, Scotland	16.57	994.20
Mrs. Jane Munro, Collingwood	18.66	1,119.60
Mrs. Margaret Bowie, Collingwood	32.50	1,950.00
Mrs. Sarah Kerr, Collingwood	51.00	3,066.00
Mrs. Carrie Dobson, Northumberland, Eng.	16.57	994.20
Mrs. Mary Jane Johnson, Toronto	19.50	1,170.00
Mrs. David Lawson, Chatham, N.B.	18.51	1,110.50
Mrs. W. H. Wright, Toronto	67.83	4,069.80
Mrs. Matilda Wright, Toronto	25.00	1,500.00
Miss Mary Evans, Toronto	18.66	1,119.60
Mrs. Christina Clark, Thorold	22.66	1,359.60
Mrs. Elizabeth Waites, Dixie	16.57	994.20
Mrs. Elizabeth O'Dell, Thornton	69.71	4,182.60
Mrs. Marcia Crossley, Thornton	20.83	1,249.80
James Melvin Speers, Thornton	20.83	1,249.80
Mrs. Agnes Grey, Hamilton	24.33	1,459.80
Mrs. Betsy Robertson, Parry Sound	18.83	1,129.80
Mrs. Mary Lediard, Midland	46.00	2,700.60
Mrs. Emma McMillan, Midland	17.60	1,056.00
Mrs. Margaret McConkey, Midland	69.66	4,179.60
Mrs. Janet Stalker, Penetang	17.60	1,056.00
Mrs. Emmeline Lougheed, Collingwood	30.16	1,809.60
Mrs. Ellen Buckley, Owen Sound	46.50	2,790.00
Mrs. Margaret Ellen Stead, Owen Sound	20.83	1,249.80
Mrs. Christina McDonald, Goderich	16.57	994.20
Mrs. Annie McDonald, Goderich	16.57	994.20
Mrs. Amanda Harris, Wharncliffe	16.57	994.20
Sam Walker, Sarnia	16.57	994.20
Mrs. Josiah Williams, Sarnia	16.57	994.20
Mrs. Jane Zinc, Corunna	17.60	1,056.00
Mrs. Dorothy Cattanach, Sombra	17.60	1,056.00
Mrs. Annie Piteau, Cornwall	16.57	994.20
Mrs. Mary Coumans, Chepstowe	16.57	994.20
Mrs. Isabella McInnis, Johnson, Grey County	16.57	994.20
Mrs. Teresa McSorley, Kingston	53.33	3,199.80
Mrs. Maranda Tait, Kingston	31.33	1,879.80
Mrs. Mary Woodburn, Smethwick, England	17.60	1,056.00
Total	$1,291.00	$77,460.00

The following benefits are to be paid in lump sums:—Mrs. Ethel M. Bollen, Collingwood, $500; while Mrs. Jordan, Collingwood; William Henry Wolford, Toronto; Mrs. Margaret Adams, Hawkstone; Mrs. Priscilla Banting, Thornton; Andrew Shea, Sydney, C.B.; William A. Boutilier, Seabright, N.S.; Mrs. Elizabeth Thomson, Toronto; Richard Boyd, Waubaushene, and Paul Dusome, Spanish Mills, Ont., will receive $200 each, making a total of $2,300.

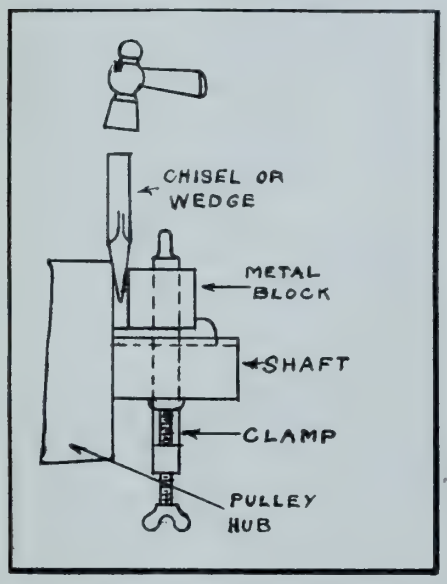
READERS' NOTES AND VIEWPOINT

Devoted to Brief Article Contributions Covering Experiences, Correspondence and Comment on Matters Marine. We Pay for Suitable Material.

HOW TO PULL A TIGHT KEY.

By N. G. Near.

THERE is shown herewith a little scheme that I have found useful for pulling tight keys. The drawing makes the operation self-evident. The metal block is thicker than necessary in order to show the method more clearly. It is,



HOW TO PULL A TIGHT KEY.

in fact, better to use a thinner block thus making the overturning movement less. Of course the exact arrangement illustrated need not always be strictly followed, there being a hundred and one variations based on the same principle.

SHIPBUILDING AND LAUNCHING.

By H. Womersley.

THE building of a ship is always accompanied by a certain amount of romance which it is difficult to define. For the first few months the structure bears little resemblance to the craft she will eventually be, but as work progresses and the skeleton is clothed in its steel covering, the ultimate form begins to take definite shape. The original plans are drawn, as a rule, to a scale of a quarter of an inch to the foot, and after having been worked out on paper, they are **layed-off** as it is called.

As soon as the **laying-off** is well in hand and the material begins to arrive, the blocks on which the vessel will be built are put in place. These blocks are of very tough timber some four to six feet in length, and are placed in piles at varying distances apart, according to the weight of ship being built. They must be high enough to allow men to work underneath the ship's bottom, and their tops should slope towards the water edge in a gradient of about half an inch per foot, so that the ship may be easily launched when the time comes.

Building Feature.

In the building of a ship, the first part to be laid is the keel, which consists of plates joined together to form one continuous bar. The ribs or frames which have been bent to template are now brought to the ship and erected, and the beams joining the opposite ribs are next hoisted into place and secured. These beams support the steel deck plating, which gives extra strength to the ship. Before the deck plating is put on, the bulkheads are placed in position.

The stem post and stern frame are placed early, the stem post being the cast steel bar extending from the keel up to the highest deck, and to this the steel plating forming the outer skin of the ship is attached at its forward end. The stern frame at the after end of the ship forms the support for the screw shaft and the connections for the rudder, the latter of which is as a rule not fitted until later on. The shell plating is secured to the stern frame in manner similar to the stem post.

When the framing of the ship has made sufficient progress, the outside or shell plating is riveted to place. After riveting the plate edges are caulked to make them watertight. On vessels with double bottoms or ballast tanks a water test is made, after which, when satisfactory, the various compartments are cleaned and painted inside and out. Fitting the interior equipment of woodwork, steam winches, pumps, propeller shaft, propeller, and in some cases almost everything with the exception of masts and stack is next undertaken.

During building, the ship has been resting on keel blocks, but as the day of launching approaches, a body of workmen are kept busy building the launching ways, or wooden slides, extending from the bow of the ship for some distance into the water. Attached to either side of the bow and stern of the ship are wooden "cradles" and the lower surfaces of these rest on the launching ways. They are fitted to support the find ends of the ship where her bilge is not more or less flat.

On the day of the launch the weight of the ship is wholly transferred from the blocks upon which she has been built to the launching ways. This is done by a body of men who drive in wedges to lift the vessel mass bodily off the stocks, and place it on the sliding ways. The ways or slides are scraped clean and liberally smeared with tallow and soft soap to lessen friction. At this juncture, all that keeps the vessel from moving into the water are a number of props known as dog shores.

Hydraulic jacks are generally necessary to give the ship a start down the ways. At a given signal the dog shores are released, the pressure is put on the jacks and immediately she starts moving slowly down towards her native element. The speed quickens rapidly, as may be imagined, for this huge mass of steel gathers a great momentum in traveling down the ways.

The vessel is brought to rest after being properly afloat either by the dropping of anchors or by a series of wire hawsers made fast to the ship and secured to weights or anchors embedded ashore. Tugs now take her in charge, and she is berthed at the builders' wharf where completion of her equipment outfit is made.

During her trials she is tested on the measure a mile to ascertain her speed, and exhaustive progressive trials are carried out to ascertain the number of revolutions, the horse-power necessary for certain speeds, and amount of coal burnt for the various horse-powers obtained. The foregoing details in a brief and racy manner are outstanding features relative to the building and launching of all vessels which take the water in a length direction, a slight modification of the latter being of course necessary in the case of vessels which are launched broadside-on.

MARINERS MADE MERRY.

FOUR HUNDRED people attended the tenth annual "At Home" of Council No. 4, National Association of Marine Engineers, held at the city hall, Kingston, and the event was a most enjoyable one to all who were present. The local council had as their guests, the visiting delegates to the marine engineers' convention, the night session having been postponed for the "At Home."

The hall was prettily decorated and a fine programme of music was rendered by the Grand Opera House orchestra. Supper was served in Ontario hall. The

caterers were Messrs. Reid and Hambrook and they gave a first-class service in every way. The delegates to the convention had supper together, a special table being set for them on the platform. Those who did not join in the dance, enjoyed a game of cards.

The members of the local council having the arrangements in charge are deserving of praise for the success of the function. The committees were composed as follows:

Managing committee—William Dunigan (chairman), Joseph Kennedy (secretary), G. Fleming, R. Knight, F. Sullivan, R. Taylor, E. Spencer and H. Dorey.

Entertainment committee — S. M. Murray (president), Alexander Milne, John Ewen, J. W. Hazlett, James Gillie, T. Bishop, W. S. Spencer and A. E. Kennedy.

RUNNING DIESEL OIL ENGINES.

IN the event of a Diesel type engine not running properly, says the Engineering Review, the cause or causes should be investigated without delay; and the following information will be found of considerable service in showing how defects may be remedied.

If, after starting-up on air and the fuel oil is admitted to the engine, firing does not occur, it should be ascertained whether:—

(a)—The fuel filter cock is open.

(b)—There is enough oil in the nozzle.

(c)—The fuel pump contains air, discovered by bubbles rising on disconnection of the delivery pipe.

(d)—The fuel pump valves are loose, or their seats corroded.

(e)—The exhaust or intake valve-cages are loose, preventing the necessary rise in cylinder air-pressure.

(f)—The oil fuel fails to flow through the pipes, due to excesive viscosity.

(g)—Water has found its way into the fuel oil.

(h)—The suction valve is loose, discovered by applying pressure from the air injector bottle.

It should particularly be observed that, although on disconnection of the delivery pipe the fuel pump may deliver against atmospheric pressure, it may be incapable of supplying oil under the pressure of injection. Knocking is caused by (a)—the pressure of the injection air being too high; (b)—the needle in the fuel nozzle being loose on its face; or (c)—the orifice in the flame disc being too wide.

Should an exhaust valve not lift easily, observe whether the spring is broken; or whether the seating is corroded with carbon or soot. In the latter case, a very small quantity of paraffin may be used to free the spindle and guide.

A smoking exhaust indicates that:—

(a)—There is overloading.

(b)—The fuel oil is unsuitable.

(c)—The air pressure for injection is insufficient.

(d)—The starting, air, or exhaust valves are loose.

(e)—The needle of the fuel nozzle is loose, the pulverizer is dirty, or the orifice in the flame disc is choked.

(f)—The piston head is dirty.

When the governor motion is excessive or irregular, then the dash-pot piston jambs, the control rods are prevented from working easily, or the valves of the fuel pump are loose.

Defective working of the air-compressor pumps may be due to:—

(a)—The valves being dirty or loose.

(b)—Foreign matter in the inter-coolers.

(c)—The piston rings sticking from lack of lubricant, or being rusty from the presence of water in the inter-cooler.

(d)—Excessive clearance in the air chamber.

Partial loss of pressure in the air bottles may be in consequence of defective valves, or their not being screwed down tightly enough. Should complete loss of air pressure occur, the motor may be started on carbonic acid gas. Great care must be taken in this operation that all connections are in order, and all valves are ready to work properly. The vessel which holds the carbonic acid is set close to the starting bottle, and a suitable pipe fixed on to the unions provided for the purpose on these bottles. If it be found that the pressure in the injection bottle is less than that in the starting bottle, supply the injection bottle from the starting bottle first, and before the valve of the latter is opened for the admission of the carbonic acid.

Stoppage of the motor may be caused by:—

(a)—Partial or complete cessation in the fuel feed.

(b)—Water in the fuel oil.

(c)—Jambing of the exhaust valves.

(d)—Overload.

(e)—Seizing of the air compressor piston from lack of lubricant.

(f)—Seizing of a main bearing from insufficient oil, manifested by the absence of crank oscillation on stopping.

Where a compressor of the Reavell type is employed, it is necessary that the mechanism be kept scrupulously clean, and lubricating oil of good quality be used. Indifferent lubricant is extremely liable to stick the piston rings, so that much of the air pressure escapes. Moreover, the air volume may be rendered insufficient in consequence of foreign matter or carbon on the faces of the valves and their seatings. Unless a full body of water be maintained in circulation, rapid heating will occur, thus causing carbon deposit which will affect proper compression.

Should a rise of pressure take place in the intermediate receiver, the high pressure or delivery valves must be examined for leakage. This operation is effected by opening the drain cock on the intermediate purge pot and allowing full pressure to enter from the air tank above the high-pressure delivery valve.

(a)—If air escape from the cock, then the high-pressure intake and delivery valves are both leaking, but, even though no air escapes, one of these valves may be loose, because, if one of them seats correctly, that is alone sufficient to stop a leak into the intermediate purge pot.

(b)—By removing the high-pressure delivery valve, replacing the cap, and readmitting the pressure to the high-pressure cylinder, the defective valve may be discovered. Leakage in the high-pressure intake valve is shown by air escaping from the drain-cock of the intermediate receiver; and should the valve be tight, air must be admitted behind the delivery valve, after removal of the intake valve, from the seat of which air will escape if the delivery valve is leaking. The same methods are applicable in the event of pressure increase in the low-pressure receiver, and these are effected between the low-pressure and the intermediate cylinders, the high-pressure intake and delivery valves being detached. For testing, the air pressure should not exceed approximately 100 lb. in the low-pressure reciver, and 400 lb. in the intermediate chamber.

MOTOR BOATS AND MOTORS IN CANADA.

THE annual trade figures recently issued show that the imports into the Dominion during the year ended 31st March, 1913, of pleasure launches of steam, gasolene, or other motive power numbered 222, of a value of $120,578. The United States holds nearly all the trade, supplying 212 of the total for the year. The United Kingdom sent 3, Hong Kong, 6; and Norway, 1. Of gasolene engines the total imports in the year ended 31st March, 1913, were 27,255, valued at $3,413,595, and here again the U.S. predominates with a total of 26,966, compared with Britain's 72, and Germany's 1. Canada's exports of gasolene launches of her own production in the year 1912-13 amounted to eight (seven to the States and one to Alaska), valued at $12,100. Eighteen launches not of Canadian origin were sent out of the country, valued at $10,450.

ST. LAWRENCE RIVER PILOTAGE.

A PETITION, in which disappointment at the Government's failure to fulfill the recommendations of the report of the Royal Commission regarding the Pilotage Districts of Montreal and Quebec was expressed, has recently been sent by the council of the Montreal Board of Trade to the Governor-General-in-Council, the Senate and the House of Commons. At the regular meeting a few days ago, the secretary announced that the petition had been forwarded.

It will be recalled that the meeting of the Board of Trade Council held on the 11th inst., a letter was submitted from a representative of a London marine insurance firm stating that at a meeting of the marine underwriting interests there, the hope was expressed that the Montreal Board of Trade would impress upon the Dominion Government the great importance of improving the pilotage service both on the St. Lawrence and at Canadian seaports, as it would seem that many serious accidents to steamships have been due to faulty pilotage. The council on that occasion reaffirmed its resolution of last year recommending that the findings of the Royal Commission regarding the pilotage districts of Montreal and Quebec should be adopted.

Petition to Ottawa.

The petition which was sent to Ottawa was as follows:

"That your petitioners on 30th April, 1913, adopted the following resolution, which was communicated to the Right Honorable the Premier and the Honorable the Minister of Marine and Fisheries:—

"Resolved: That the Council of the Montreal Board of Trade, having considered the 'Report of the Royal Commission appointed to inquire into and report upon the law respecting the pilotage and its administration in the pilotage districts of Montreal and Quebec, and what changes, if any, are desirable therein,' believes the statements made therein regarding the pilotage service to be absolutely justified, and the Council hereby declares that it is in hearty accord with the findings of that report.

"That, in the interest of our national route to Europe, via the St. Lawrence, there is urgent need for a reduction in the rates of marine insurance on ships using that waterway, and that in order to obtain such reduction, it is necessary that everything possible should be done towards making that route as safe as rival routes by U.S. ports.

"That, to the knowledge of the Council, the underwriters at Lloyds consider the St. Lawrence pilotage system to blame for some of the casualties that have occurred on the St. Lawrence route, and that the report of the Royal Commission confirms this fact as to losses, the blame for which is laid to the inefficiency of the pilots.

"That the faults of our pilotage system have worked detrimentally to the interests of Canada, and that the Council is confident that it speaks the mind of all concerned, from the grain grower in the West to the shipper at the ocean port, in urging the Government to proceed with the reform of this system without reference to local or political interests.

"That the Council, therefore, prays the Government to forthwith fulfill the recommendations of the report of the said Royal Commission on Pilotage."

Non-Fulfilment Comment.

In commenting upon the non-fulfillment of the above recommendations, the petition continues:

"That to the great disappointment of your petitioners and of all interested in navigation of the St. Lawrence below Quebec, the Government has not fulfilled the recommendations of the report of the Royal Commission regarding the pilotage districts of Montreal and Quebec, although that report declared as follows:—

" 'The great increase in the number and size of the vessels using the St. Lawrence route in late years, and the prospects of a still further increase, renders it imperative that the very best service possible should be obtained and given if the route is to get rid of the reputation which it has at present with underwriters, and which is a handicap on shipowners and reacts on exporters and importers.'

"That at a meeting of the London underwriters held with regard to the request made by the Dominion Government and by your petitioners that the insurance rates on vessels using the St. Lawrence route should be reduced, it was stated that the findings of the court in several accidents on the St. Lawrence route would seem to show that they had been due to faulty pilotage, and, therefore, that it was of great importance that every effort should be made to improve the piloting service on that route.

"That the Liverpool Underwriters' Association in its last annual report says that it earnestly hopes that the recommendations of the Royal Commission on pilotage for the better organizing and administering of the pilotage service on the St. Lawrence route will bring about a material reduction of the risks of navigation in this important waterway.

"That it is urgent that the improvement of the pilotage service below Quebec be effected before the opening of navigation this year, so that the British Marine underwriting interests may be assured that the Dominion Government is doing its part towards securing a reduction in the marine insurance rates on the St. Lawrence route.

"Wherefore your petitioners humbly pray Your Royal Highness in Council to promote legislation embodying the recommendations of the said Royal Commission on Pilotage in the pilotage districts of Montreal and Quebec."

Signed on behalf of the Council of the Montreal Board of Trade, R. J. Dale, president; Geo. Hadrill, secretary. Montreal, February 14, 1914.

MARINE BOILER EXPLOSIONS.

AMONG the reports issued by the Board of Trade recently, says the Marine Engineer and Naval Architect, occur a few which are of interest to the marine engineer, and are well worthy of reference. The main boiler of a small coasting steamer exploded, fortunately without injuring anyone. The boiler was of steel, with iron tubes, and of the ordinary single-ended marine type. There were two plain furnaces each having a separate firebox.

The principal dimensions of this boiler were—Shell diameter 12 ft. 6 in., length 10 ft. 3 in., shell plates 1 1/16 in. thick, in two pieces with treble riveted, double butt straps, furnaces 3 ft. 7 in. external diameter, 6 ft. 7 in. long, wrapper plates 5/8 in. thick, the crown plates being stayed by six girders with stays screwed into the plate and nutted. Two spring safety valves were fitted for a working pressure of 160 lbs., per square inch. On leaving port, the water in the boiler was stated by the attendant to have been 1½ in. from the top of the glass, and during his watch the water appeared to be rising, this he thought might be due to the condenser leaking. As the water still seemed to be gaining he opened the blow-down for a few minutes without any apparent effect.

About midnight he heard a report while in the engine-room and at once stopped the engine; a second report followed and the stokehold and engine-room were filled with steam. The attendant and fireman escaped on deck and the vessel was subsequently towed into port. On examination it was found that ten stay nuts had been forced off the girder stays of the port combustion chamber, and the crown plate had collapsed about 5 in. There were no signs of wastage and the plates were practically free from scale. The water gauges and mountings were found to be clear and in good working order. When the water was just showing in the glass there was about 3½ in. over the combustion chamber crown.

The inference drawn from the investi-

gation was that the attendant had mistaken the quantity of water in the boiler and the glass had shown false water, due to a valve being shut or a pipe being choked. Had he known, as he should have done, how to apply the test he would have saved the boiler from disaster.

Another explosion occurred in the boiler of a steam trawler, fortunately without causing injury to life or limb. The material of the boiler was steel; it was 12 ft. diam. by 9 ft. 9 in. long, with two corrugated furnaces, 42½ in. diam. at the plain parts and 46½ in. diam. over the corrugations. The front end was made up of two plates, the top being 1 1/16 in. thick, and the lower 15/16 in. thick, flanged inward for the furnaces, to which it was double riveted. The spring safety valves were loaded to 200 lbs. It was fourteen years old, and a new starboard furnace and port firebox had been fitted in 1905. As the original furnace had been welded to the back tube plate, a new saddle plate had to be fitted. When the repairs were completed the boiler was tested to 300 lbs. hydraulic pressure.

The vessel proceeded on a run towards Iceland, and, having arrived at the fishing area, the engines were stopped and preparations were made to shoot the nets, and the deck machinery was got ready. The engine driver, on returning below, heard some steam blowing, and tracing it to the stokehold, found the plates covered with hot water and the passageways full of steam. As soon as the place was clear, he found the front end-plate fractured above the port furnace for about 22 in., and he was able to insert the blade of a knife in the centre of the crack.

A temporary repair was effected by means of ½ in. studs at each end of the crack, and the plate caulked. This was enough to enable steam to be raised, sufficient to shift to safer anchorage. This being accomplished, the boiler was again emptied, and the length of the crack was laced with ½ in. and ⅝ in. studs. This repair admitted of bringing the vessel back to her starting port with 90 to 95 lbs. pressure, but as the fires were allowed to cool down the crack opened out and leaked. The cracked part of the plate was cut away and welded up; a covering patch of 9-16 in. Low Moor plate was also fitted inside the boiler. A similar covering plate was also fitted over the starboard furnace, and both corrugated furnaces were removed and replaced by plain furnaces.

The giving way of the plate was attributed to panting action, caused by the expansion and working of the furnaces, gradually leading to an almost imperceptible grooving, ultimately ending in rupture.

NAVIGATION OF BAY OF FUNDY.

THE wreck of the steamer Cobequid on Trinity Ledges, near Yarmouth, N.S., has been followed by the publication of statements which are so false and are so injurious in their nature in regard to the navigation of the Bay of Fundy that the St. John Board of Trade is again called upon to appeal to the record and prove the utter falsehood of these assertions. Twice before, in 1887 and 1898, the Board issued books giving an authoritative record prepared by the Department of Marine and the officials of the St. John Customs House, proving beyond question that the port of St. John was one of the safest, if not the very safest, for navigators along the whole coast north of Cape Hatteras. It was shown that the percentage of loss to vessels and cargoes going in and out of St. John was so extremely small as to establish beyond question the safety of the port, and the ease with which the Bay of Fundy could be navigated at all times of the year. Statements were also published from the harbor master at St. John, and from captains and pilots who had been sailing in and out of the Bay for 25 to 30 years, and their testimony was all of the same character.

In 1887 the people of St. John were vigorously demanding that the Canadian trade in winter, which was then carried on through United States ports, especially through Portland, Me., be transferred to the Canadian port of St. John. They were opposed by transportation interests, and they found also that there was a widespread prejudice against the Bay of Fundy. This was not wholly founded on ignorance, for unfortunately the Admiralty and other charts conveyed a most erroneous impression regarding the safety of navigation in the bay. As late as 1877 a chart issued in London described the navigation of the bay as most dangerous, because of shoals and other impediments, whereas the very reverse is true, and there is a broad and deep seaway all the way up the bay to the port of St. John. At the narrowest point near the mouth of the bay there is 18 miles of deep water, and to a vessel from the other side of the Atlantic it is only necessary to turn from the course to Portland or Boston and find a clear seaway right up to St. John.

Safety of the Bay.

One evidence of the safety of the bay is that the steamship line between Boston and St. John, making daily trips in summer and two or three trips per week in winter, has never in its long experience lost a life at sea. Its steamers have gone up and down the coast in all kinds of weather all through the year in safety. Necessarily the Bay of Fundy, in common with the whole North Atlantic coast, is at times subject to great storms, when extreme care must be exercised; but that does not make this great body of water more dangerous than the approach to any other port.

The book issued by the Board of Trade in 1887 gave a record for ten years, showing an extremely small percentage of loss to vessels or cargoes. The book issued in 1898 gave the record for the succeeding ten years, and it was even more favorable than the first, for the reason no doubt that there has been a steady increase in the aids to navigation in the bay. It is only necessary to quote the percentage of losses for ten years from 1887, and to add that the percentage since has also been extremely small, and that, up and down the bay to and from St. John, steamships of more than half a dozen ocean lines are constantly sailing in winter in perfect safety, to show how unfounded have been the statements made in utter ignorance of the facts, by those, who, since the Cobequid was lost, have busied themselves slandering the Bay of Fundy.

Percentage of Losses.

Percentage of losses in the Bay of Fundy during the ten years from 1887 to 1896 to sea-going vessels sailing to and from the port of St. John, N.B.:—

1.—The percentage of loss of tonnage of steamers as compared with total tonnage of steam vessels entered and cleared is .0006 of 1 per cent.

2.—The percentage of loss of tonnage of sailing vessels as compared with total tonnage of sailing vessels entered and cleared is .0017 of 1 per cent.

3.—The percentage of loss of cargoes of steam vessels as compared with the total amount of imports and exports is .0003 of 1 per cent.

4.—The percentage of loss of cargoes of sailing vessels as compared with the total amount of imports and exports is .0017 of 1 per cent.

5.—The percentage of loss of tonnage of both steam and sailing vessels as compared with total tonnage entered and cleared is .0011 of 1 per cent.

The Board of Trade is preparing another statement, bringing the record up to date, but it would, perhaps, be too much to hope that it will silence those who may have an interest in spreading false reports regarding the safety of navigation to and from the port of St. John.

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PRINCIPAL CONTENTS.

THE BUSINESS OUTLOOK.

TO all appearance the business depression in Canada struck bottom some time since, if we might judge by the reports of improving tone in the machinery and allied trades. Easier money conditions now prevail, and what is perhaps the most potent feature of all, people generally have become optimists. As remarked on a previous occasion when the descent was still in progress, everybody was lending their weight to accelerate it, and as becomes human nature, all hands are now engaged in the elevating process.

The development and progress of Canada, dependent though it be to a large extent on conditions in other countries must go on, and in this connection there is just the possibility that more of the financial assistance so generously received from Great Britain will this year be forthcoming, if, as is generally believed, the crest of the wave of industrial prosperity there was reached in the closing months of 1913.

The shipbuilding industry throughout the Dominion is for the most part in a rather healthier condition than has been the case for some years back, and were our successive Governments to devote themselves to dealing with constructive, instead of destructive policies, and give even a fraction of the time and financial support to the discussion and propagation of this feature of our national development that they bestow on the enterprises of what are practically individual or personal undertakings, whose success, or for that matter, whose national benefits are more or less problematical, a marked general increase in, and larger outlook for, our trade and commerce would be at once apparent.

In another section of this issue, reference is made to the coming of Yarrows, Limited, to our Pacific coast with a view to the development of shipbuilding and marine engineering there, and no microscope is necessary to detect in the details of the interview recorded that Canadian shipbuilding is not only a possibility on a large scale, but that our Governments of whatever party must lend a hand in temporarily fostering it. As a hopeful feature in the matter of early steps being taken to further the industry may be mentioned the decision to have all Government vessels built on our shores in future, and the growing strength and influence of our shipping and shipbuilding interests. Favors, like honors, are all the better for judicious distribution, and while the natural disposition with most of us is to take all that comes and look for more, there has, as yet, been little of the assistance so apparent in railroad and steel works and other spheres, given to an industry that would help and prosper all of these.

GREAT LAKES DISASTER FUND.

WE wish to compliment the committee, who initiated and took charge of the fund raised on behalf of the relatives of our lake mariners who lost their lives in the disastrous storm of November last, on the prompt and business-like manner in which they have handled their trust. We are right in saying that on no previous occasion when public contributions were made on behalf of those whose bread-winners had en bloc met an apparently untimely end, has such dispatch been equaled or even approached, nor have a sympathetic public and sorrowing relatives ever had more genuine satisfaction and solace than the present instance affords. The tendency generally is, immediately following a subsidence of the excitement and horror due to a particular tragedy, to allow the matter of aid to those left dependent to drag on indefinitely, and at best to dole out miserable pittances in a charity-dispensing manner. Our Lake Disaster Fund Committee, in realizing and discharging their trust, as indicated, have set an example, not only for Canadians to emulate, but one which all of the older civilized nations of the world might well copy.

MARINE NEWS FROM EVERY SOURCE

Ottawa, Ont.—Mr. Hazen has announced that the contract will shortly be let for the new ice-breaker for the St. Lawrence.

St. John, N.B.—The Board of Trade announces that they have plans for having St. John dry dock enlarged to make it 1,150 feet long.

St. John's, Nfld.—The Maritime and Newfoundland Steamship Co., Ltd., are having a large steel screw steamer built on the Clyde by the firm of Bow & MacLachlan, Paisley, Scotland.

Sault Ste. Marie, Ont.—The chief engineer of the Public Works Department has reported favorably upon the application of the Sault Ste. Marie Dock Co. for a subsidy under the act on a projected outlay of a million dollars.

Whitby, Ont.—The town council has under consideration a proposition from some United States promoters for the establishment of a car ferry between Whitby and Olcott, N.Y., involving an estimated expenditure of $1,500,000.

5,000-Ton Motor Liner.—The Mississippi, the first motor liner of 5,000 tons built for the Atlantic transport line, was launched in Glasgow on Feb. 11. The vessel is fitted with two main engines of 1,600 horse-power each ,and two auxiliary engines.

Halifax, N.S.—Halifax is to have the largest dry dock in Canada, and the Public Works Department has sent down surveyors to determine the exact location. As soon as the site is fixed, the preparation of plans will be begun, and the work will proceed this year.

Quebec, Que.—The Government, after making searching inquiries into the suitability of the sites proposed for the new dry dock, has finally adopted a location in the immediate vicinity of the present dock at Levis. Operations have not yet been begun, but everything is ready for an early start.

Lake Vessel to be Scrapped.—For probably the first time in the history of the passenger steamship business on the Great Lakes a passenger ship of comparatively modern type is to be scrapped by her owners instead of being sold. The Detroit & Cleveland Navigation Co. will take this course in the case of the steamer City of the Straits.

Lake Storm Boosts Shipbuilding.—Both in Canadian and American shipyards many vessels are being built, and everyone is being more strongly constructed than those turned out in recent years. A boat to take the place of the James Carruthers, now on the bottom of Lake Huron, is being constructed at Collingwood, and a successor to the Howard M. Hanna is being built in Cleveland.

Ottawa, Ont.—Negotiations are in progress between the C.P.R. and the Government, looking to a greatly improved service on both the Atlantic and Pacific. It is understood that the proposition involves the construction of further new ships for both the Atlantic and Pacific, and they will have such a speed as will shorten the time necessary for the trip between Vancouver and China and Japan by several days.

Deep Waterway Delegation.—At a meeting of the executive of the Great Waterways Union held in Berlin, Ont., on Feb. 19, a resolution was passed to take a monster delegation to Ottawa, to ask the Government for a waterway of 35 feet from Montreal westwards to the head of the Lakes, and that the international features of the project be taken up with the United States for the earliest possible determination.

Georgian Bay Canal.—The Charlottetown, P.E.I., Board of Trade communicated a resolution to the recent Montreal Board of Trade Council meeting endorsing the move for the construction of the Georgian Bay Canal with the least possible delay, and urging upon the Government that provision be made in the public estimates during the present session for the commencement and carrying out of the work on both the eastern and western sections.

Campania to be Broken Up.—After twenty-one years' service on the Atlantic, the famous record-breaking Cunard steamship Campania is to be sold to shipbrokers next July, according to an announcement made in New York on Feb. 4. The new steamer Aquitania will take her place in the New York and Liverpool service. During her long career the Campania has made 240 round voyages between New York and Liverpool, and has carried more than 100,000 first-class passengers.

Canada Steamship Lines.—The reason for the failure of the Canada Steamships' issue of £1,300,000 fives at 93, ninety per cent. of which was left with the underwriters, is being much discussed in Montreal financial circles. The fact that simultaneously the Eagle Oil Transport issue of £1,000,000 was largely oversubscribed would seem to indicate that the public expect a better yield for individual issues.

Toronto, Ont.— Two dredges to cost $500,000 have been ordered for the work of deepening Toronto harbor, with a capacity of 18,000 cu. yds. per day each, to be ready by July 1st. The contract for the two dredge hulls has been placed by the Canadian Stewart Company, who will do the harbor work, with the Polson Iron Works, Toronto, along with another contract for a large steel derrick scow to cost $40,000.

Prince Rupert, B.C.—Activity is now being manifested at the $3,000,000 drydock under construction for the G.T.P. railway and steamship interests. Immense quantities of steel for structural purposes, lumber and machinery are arriving weekly, the last being a 1,500-ton consignment now being unloaded from the steamship Kentra. The steel frame of the foundry is finished, and that for the numerous other buildings will shortly be in place. The floating drydock, according to plans furnished by William T. Donnelly, will have a lifting capacity of 20,000 tons, and is so designed as to be capable of operating in sections as a number of smaller docks.

Sarnia, Ont.—Over one million dollars' worth of vessels in marine values is what the Reid Wrecking Co., with its fleet of powerful tugs and wrecking outfits, has wrested from the rocks and shoals and brought into port since the Lakes storm of November 9. This is a remarkable record. The steamers which comprise this list are:—The Matoa, Acadian, Northern Queen, Nottingham, Nicholas, Buckley and the Matthew Andrews. With the exception of the latter, each of the others can be classed as wrecks, being cast up on rocks or beach. The values of the steamers are Matoa, $650,000; Acadian, $125,000; Nicholas, $130,000; Northern Queen, $130,000; Matthew Andrews, $350,000; Nottingham, $250,000, and the Buckley, $20,000.

Port Arthur, Ont.—The C. P. R. steamers Alberta and Athabasca are in dry dock here undergoing repairs. They will remain until practically the opening of navigation.

Quebec, Que.—The Quebec Harbor Commissioners are applying to the Dominion Government for a loan of $2,000,000 to be used for the general development of the port.

Launch at Coquitlam, B.C.—The first ocean-going vessel built on the Fraser or Pitt Rivers was successfully launched from the ways of the Coquitlam Shipbuilding & Marine Railway Co, on January 31. She is a four-masted schooner.

Kingston, Ont.—The Kingston Shipbuilding Co. have been awarded a contract by Reuben Miller, Pittsburgh, Pa., for a steam launch 47 ft. long by 9 ft. beam. They are also building the hull for a steam tug for the Brompton Paper Co., Quebec.

Harland & Wolff, Ltd., have made provisional arrangements for the launch of 8 vessels with a total tonnage of 190,000 tons from their Belfast yard during the present year. The biggest of the eight ships are the White Star liner Britannic, 52,000 tons; a Holland-America liner, 36,000 tons; and a Red Star liner, 26,000 tons.

Prescott, Ont.—The ferry steamer City of Belleville, running between this town and Ogdensburg, N.Y., was burned to the water's edge on February 17, at her dock here. The loss is estimated at $20,000. The vessel was built at St. Catharines, Ont., in 1878, and has been in the ferry service for the past twenty-five years.

Chatham, N.S.—The Miramichi Foundry has under construction two large tugs, which are to be delivered as soon as navigation opens. They are 70 feet over all, and are equipped with engines of 100 horse-power. All the machinery with the exception of the boilers, which are being furnished by the Matheson Co. of New Glasgow, has been built by the local firm.

Sarnia, Ont.—Only one bid was submitted to R. F. Jones, of Cleveland, in response to the advertisement for the sale of the steamer Nicholas, which went aground in Thunder Bay, Lake Huron, during the big storm of November last. The one bid for $5,000, made by A. B. Mackay, of Hamilton, Ont., will be submitted to the underwriters in England for approval. There is a wrecking bill against the Nicholas of some $70,000. The boat is in the Reid Wrecking Co. dry dock.

Wellington, Ont.—Sealed tenders, endorsed "Tenders for harbor improvements at Wellington, Ont.," will be received by the Department of Public Works, Ottawa, until 4 p.m. on Monday, March 16, 1914, for the construction of harbor improvements at Wellington, Prince Edward County, Ontario. Plans, specification and form of contract can be seen and forms of tender obtained at the offices of the Department, and at the office of the district engineer, Confederation Life Building, Toronto, Ont., and on application to the Postmaster at Wellington, Ont.

Suez Canal Deepened. — It is announced that the Suez Canal has been further deepened to 32 ft., and that dredging operations are in progress which will eventually give the waterway a uniform depth of 39 feet. Vessels drawing 29 feet are now allowed to pass through the canal, and 29 feet of draught depth comprises vessels of very large size. Just recently a Hamburg-Amerika liner of 17,340 registered tonnage made the passage with a margin of 3 feet of water under the bottom. A breakwater at Port Said to prevent the silting up of sand by the cross currents is also in progress.

"Niobe" and "Rainbow" Upkeep.—According to the Auditor-General's report, presented to the Commons, giving details of expenditures for the last fiscal year, the total cost of Canada's two naval vessels, the Niobe and the Rainbow, for maintenance, repairs, etc., during the twelve months, was $753,874. For the maintenance of the Halifax drydock and dock yard, there was a total expenditure of $302,844, and for the Esquimalt naval dockyard and drydock $149,083. Included in the expenses charged up to the Niobe is the sum of $159,780 for repairs consequent upon the accident in Yarmouth harbor in 1911. The total cost of the accident has been approximately $187,000.

Launching Season Opens on Lakes.—To the accompaniment of shrill blasts of steam sirens, the new steamer Huron, the largest self-unloading freighter in the world, slipped gracefully down the ways into the water at the Ecorse yard of the Great Lakes Engineering Works on the afternoon of Feb. 7. The vessel, the first to be launched on the Great Lakes this year, is to the order of the Wyandotte Transportation Co. The Huron is not only the largest, but by far the most modern stone-carrier of her type, being virtually the only coarse freighter in existence to be equipped with a self-unloading device. She is of 8,000 tons burden, and when completed will operate exclusively in the stone and coal carrying business. Her length is 436 feet over all, beam 56 feet, and moulded depth 30 feet.

Largest Steam Trawler Afloat.—Cochran & Sons, Ltd., Selby, launched on Jan. 15, the steel screw trawler Maroc, believed to be the largest of her type afloat. Her principal dimensions are 175 ft. by 29 ft. moulded. She has been specially built for the Newfoundland fishing to the order of Mr. J. Huret, of Boulogne, France, and will be fitted with powerful triple-expansion engines and large boiler by Amos & Smith, Ltd., of Hull. The vessel will have accommodation for a crew of about fifty hands, and will be fitted with powerful steam trawl, winch, steam windlass, steam-steering gear and electric light throughout. She has also an insulated fish-room, large tanks for carrying fresh water for the boiler and is to be fitted with wireless telegraphy.

Farrar Transportation Co.—At the annual meeting of the Farrar Transportation Company, held at Collingwood on Jan. 27, the following directors were re-elected:—President, L. I. Thompson, Owen Sound; Vice-president, E. R. Wayland, Fort William; secretary-treasurer and manager, G. E. Fair, Collingwood. Directors—E. Stubbs, Sault Ste. Marie; D. D. Lewis, Lorain, Ohio; W. E. Allen, Toronto; M. Snetsinger, Thornbury; G. P. Pearsall, Toronto; John Shultes, Port-Colborne; C. L. De Sola, Montreal. The gross earnings of the company's steamers, Collingwood and Meaford, during 1913 were $166,620.33, and the net earnings $71,236. The dividend rate for the past year was ten per cent., with a bonus of five per cent. The assets of the company amount to $496,254.85, and the liabilities, including the stock, to $332,478.22, leaving the surplus of assets over liabilities at $163,976.63.

Safety of Life at Sea.—The International Conference on the Safety of Life at Sea, which has just concluded its meetings, has agreed to a number of important regulations, which it is intended shall be international in character. In the first place, the duty of patrolling the Atlantic and reporting ice and derelicts is being undertaken by the United States. All ships of more than 13 knots speed and carrying 200 or more passengers, and making voyages of more than 500 miles between port and port, must not only be fitted for wireless telegraphy, but must maintain a continuous watch throughout the 24 hours. A similar regulation will apply to vessels carrying only 25 passengers when making voyages more than 500 miles from land. Vessels not carrying passengers are also to be fitted with a wireless system if they have on board more than 50 persons, and must keep a continuous watch in the

signal-room when more than 1,000 miles from land. Provisions as to the subdiovision of vessels have also been agreed to. Boat accommodation is to be provided for 75 per cent. of the total number of persons on board, plus raft accommodation sufficient for the remainder, and provision must be made for adequate manning of these boats.

N. A. M. E. GRAND COUNCIL CONVENTION.

THE Biennial Convention of the National Association of Marine Engineers in Canada met in Kingston, Ont., from February 3 to February 6. The various sessions, morning, afternoon and evening each day, were held in the Board of Trade Rooms, which were granted free of charge. At the opening session Mayor Shaw welcomed the delegates to Kingston, and expressed the hope that their deliberations would lead to results having for their object a higher standard of proficiency of the craft, a larger recognition of the importance of the latter, and the greater security of their own and passengers' lives committed to their care and keeping while pursuing their calling.

The Kingston Locomotive Works, Queen's University and other places of interest for which the Limestone City is famous were visited between convention sessions, and much satisfaction was expressed with the splendid arrangements which had been made by the local lodge for the comfort and entertainment of the delegates. A. R. Milne, Kingston, and A. F. Hamelin, Montreal, were appointed to wait on the Marine Department, Ottawa, to place before the Government certain amendments proposed by the convention, to the Steamboat Inspection Act. The place of holding the next biennial convention will be decided later by the Grand Council.

Dobbie, McInnes, Ltd., Glasgow, Scotland, have sent us a copy of their latest catalog dealing with the nautical appliances which they manufacture. The catalog is divided into sections, each being devoted to different types of apparatus such as compasses of various styles, including the "Kelvin" and "R.D.C." compass, sounding machines, clocks, barometers, foghorns, binnacles, etc. The reading matter deals clearly with each specialty and the illustrations are excellent. Tables are included which give prices and code words for each type of apparatus, while each section has its own index. This is a handsome catalog, copies of which may be obtained by interested readers.

ISHERWOOD SYSTEM OF SHIP CONSTRUCTION.

THE number of vessels contracted for to be built on the Isherwood system to date now totals 276, representing almost a million and a quarter gross register tons. The number of vessels built in 1913 shows a considerable advance on 1912, as will be seen from the following figures:—

1908	2	of 7,329	tons.
1909	8	„ 21,934	„
1910	25	„ 92,709	„
1911	40	„ 154.634	„
1912	52	„ 234,615	„
1913	79	„ 384,372	„
	206	895,593	„

Included in this number are vessels of all types and descriptions, and, apart from ordinary ocean-going vessels, it is perhaps of special interest to note that three other large ore-carrying vessels have been completed for service on the Great Lakes of America.

Oil Tankers.

In the development of the oil tanker the system has played a prominent part, no fewer than thirty-nine of this class of vessel having been launched in 1913. The San Fraterno, the 15,000-ton d.w. tanker, built on the Isherwood system, probably created more interest than any other vessel built in the current year, and is the first of twelve similar steamers building on this system, other four of which have now been launched. At the present moment about 85 per cent. of the total oil-tank tonnage building throughout the world is on the Isherwood system, and, up to date, 103 vessels of this type are already built, or are being built on this system in the following countries:—

	Vessels.		Tons.
United Kingdom	66	of about	382,420
Germany	12	„	71,408
U.S.A.	16	„	51,672
France	1	„	3,500
Italy	7	„	14,000
Sweden	1	„	5,000
	103		528,000

Vessels have been constructed to the highest classification of Lloyd's Register, British Corporation, Bureau Veritas, Germanischer Lloyd, Norske Veritas, and American Bureau, and the system has been adopted by the Governments of Great Britain, United States of America, and Italy.

NEW WHITE STAR LINER "BRITANNIC."

IN connection with the launch of the New White Star triple-screw steamer "Brittanic" from the yard of Harland & Wolff, Ltd., Belfast, on February 26, the record of the first famous White Star steamer of the same name is of interest. The new steamer will be about 50,000 tons gross and be nearly 900 ft. in length. The old Britannic was only 5,004 tons and 455 ft. She was a single-screw steamer and sailed from Liverpool on her maiden voyage to New York on June 25, 1894, making during her career 271 round voyages to New York.

This historic vessel steamed 2,032,500 statute miles, consumed 560,407 tons of coal in doing so, and carried 112,711 first class and 282,685 third class passengers across the Atlantic. Towards the close of her career the Britannic added fresh laurels to her renown by acting as a transport during the South African War; by taking out to Australia the Imperial Representative Corps, composed of details of the various branches in the British Army, on the occasion of the inauguration of the Commonwealth of Australia at Sydney on January 1st, 1901. In fulfilling these missions she made 11 voyages, steamed 200,499 statute miles with a coal consumption of 65,659 tons, and carried 20,728 troops.

Thus, in all, the Britannic covered no less than 2,232,999 statute miles, and consumed 626,000 tons of coal during her epoch-making career. It was specially stipulated by the White Star Line that the Britannic, when sold in 1903, should be broken up, the owners feeling that so illustrious a career ought not be tarnished by an extended and less honorable existence.

Gerald Lomer, Ltd., Fraser Bldg., Montreal, who are Canadian sales agents for the Deutsche Machinenfabrik, A.G., Duisburg, Germany, have favored us with a copy of an interesting booklet issued by the latter firm. The booklet, which is handsomely got up, gives a concise but comprehensive history of the firm and descriptions of the various shops, in which a total of 6,000 men are employed. The Company manufacture all lines of general engineering work such as blast furnace plants, rolling mills, cranes of every type and size, forgings and ship anchors, steam hammers, open-hearth, basic and Bessemer steel works installations, etc. The booklet is divided into seven sections, each containing numerous good illustrations of representative examples of the firm's many products.

The William English Canoe Co., Ltd., incorporated at Toronto, capital $40.000, to build, sell and trade and deal in all kinds of canoes, row boats, etc., at Peterborough, Ont. Incorporators: James English, Samuel W. English, etc., Peterborough.

ASSOCIATION AND PERSONAL

A Monthly Record of Current Association News and of Individuals Who Have Been More or Less Prominent in Marine Circles

Capt. John Boyd, for 60 years a resident of Kingston, Ont., and for many years in the employ of the Montreal Transportation Co., passed away on Feb. 10.

Master and Mate Certificates.—The Department of Marine and Fisheries has decided that in future every candidate for a master or mate certificate will be required to show that he has qualified in "first aid" work by the St. John Ambulance Association.

Arthur W. McMaugh, 60 years of age a well known marine engineer and lake vessel captain died at his home in St. Catharines, Ont., on Feby. 18, after an illness of several months' duration. Captain James McMaugh, of Toronto, is a brother of the deceased mariner, the family being natives of Quebec.

Kingston No. 4, N. A. M. E.—Officers of Kingston Council No. 4, National Association of Marine Engineers have elected officers for 1914 as follows:—President.—S. M. Murray; 1st Vice.—Ed. Spencer; 2nd Vice.—Wm. McWilliams; treasurer—I. F. McEwen; secretary—Jas. Green; conductor—Geo. Boyd; doorkeeper—Geo. Suddard; auditors.—R. Taylor and R. Knight.

Henry M. Cameron, a well known shipyard draughtsman in the employ of Vickers, Ltd., Barrow, has been appointed assistant manager of the shipyard of the Canadian Vickers, Ltd., at Montreal. Mr. Cameron served his apprenticeship in the Barrow yard. He will leave for Montreal on an early date. P. L. Miller also on the Vickers Ltd., staff at Barrow, will be general manager of the Montreal plant.

LICENSED PILOTS.

River St. Lawrence.—Captain Walter Collins, 43 Main Street, Kingston, Ont.; Captain M. McDonald, River Hotel, Kingston, Ont.; Captain Charles J. Martin, 13 Balaclava Street, Kingston, Ont.; Captain T. J. Murphy, 11 William Street, Kingston, Ont.

River St. Lawrence, Bay of Quinte, Murray Canal.—Captain James Murray, 106 Clergy Street, Kingston, Ont.; Capt. James H. Martin, 259 Johnston Street, Kingston, Ont.; John Corkery, 17 Rdieau Street, Kingston, Ont.; Captain Daniel H. Mills, 272 University Avenue, Kingston, Ont.

ASSOCIATIONS

DOMINION MARINE ASSOCIATION.

President—James Playfair, Midland; Counsel—F. King, Kingston, Ont.

GREAT LAKES AND ST. LAWRENCE RIVER RATE COMMITTEE.

Chairman—W. F. Wasley, Gravenhurst, Ont.
Secretary—Jas. Morrison, Montreal.

INTERNATIONAL WATER LINES PASSENGER ASSOCIATION.

President—A. A. Heard, Albany, N.Y.
Secretary—M. R. Nelson, New York. .. ....

THE SHIPPING FEDERATION OF CANADA

President—A. A. Allan, Montreal; Manager and Secretary—T. Robb, 526 Board of Trade, Montreal.

SHIP MASTERS' ASSOCIATION OF CANADA.

Grand Master—Capt. J. H. McMaugh, Toronto, Ont.; Grand Secretary-Treasurer—Capt. H. O. Jackson, 376 Huron St., Toronto.

GRAND COUNCIL, N.A.M.E. OFFICERS.

L. B. Cronk, Windsor, Ont., Grand President.
A. F. Hamelin, Montreal, Que., Grand Vice-President.
Neil J. Morrison, P. O. Box 238, St. John, N.B., Grand Secretary-Treasurer.
F. Reid, Vancouver, B.C., Grand Conductor.
A. J. Ross, Halifax, N.S., Grand Doorkeeper.
James Gillie and A. E. Kennedy, Kingston, Ont., Grand Auditors.

A. F. Yarrow, head of the British shipbuilding concern which has taken over the holdings of the B. C. Marine Railway Co., at Esquimalt, announces that the transfer of administration took place February 1.

To Honor Capt. Inch.—At a meeting of the committee representing the City Council and Board of Trade of Halifax, N.S., it was decided to present Captain Francis Inch, the hero of the Volturno disaster, with an illuminated address and a piece of silver plate suitably engraved.

A. J. Black, who came to the drawing office of Vickers, Ltd., at Barrow, from the Fairfield Shipbuilding & Engineering Co., Glasgow, some time ago, has been appointed head of the ship draughting office at the Canadian Vickers' shipyard, Montreal. Other appointments are likely to be made shortly.

Captain William Richards, a native of Swansea, Wales, who died at Montreal on February 16, aged 95 years, was a well-known Eastern Canada shipbuilder. He founded a shipyard at Biddeford, P.E.I., in 1846, and built and launched there no fewer than 100 sailing vessels, ranging from 500 to 1,500 tons.

Shipping Federation Officers.—The following officers were elected on Feb. 11, by the Shipping Federation of Canada, for the season of 1914:—Andrew A. Allan, of the Allan Line, president; J. R. Binning, Furness, Withy Co., treasurer; Jas. Thom, Dominion Line, chairman of the executive council; Andrew A. Allan, J. R. Binning, D. W. Campbell, A. MacKenzie, W. R. Eakin and R. W. Reford, members of executive.

Directory of Subordinate Councils for 1913.

Name.	No.	President.	Address.	Secretary.	Address.
Toronto,	1	A. J. Fisher,	707 Bathurst St.	E. A. Prince,	59 Ferrier Ave., Toronto.
St. John,	2	H. E. Berry,		G. T. G. Blewett,	36 Murray Street, St. John, N.B.
Collingwood,	3	W. T. Rennie,	Collingwood,	Robert McQuade,	P.O. Box 97, Collingwood,
Kingston,	4	S. M. Murray,		James Green	
Montreal,	5	A. F. Hamelin,	3210 Le Tang Street,	O. L. Marchand,	St. Vincent de Paul, P.Q.
Victoria,	6	Alex. McNivern,	P. O. Box 234,	Peter Gordon,	808 Blanchard St., Victoria, B.C.
Vancouver,	7	Andrew T. Roy,	1212 Burrard St.,	E. Read,	859 Thurlow St.
Levis,	8	Helaire Mercier,	3 St. Joseph St.	S. G. Guenard.	Lauzon, Levis, P.Q.
Sorel,	9	Geo. Gendron,	Sorel, P.Q.,	Al. Charbonneau,	P.O. Box 132, Sorel, P.Q.
Owen Sound,	10	W. Robertson,	1030 4th Ave. East,	Richard McLaren,	447 13th St., Owen Sound.
Windsor,	11	Alex. McDonald,	28 Crawford Ave,	Neil Maitland,	221 London St. W., Windsor, Ont.
Midland,	12	Jos. Silverthorne,		Jno. A. Murphy,	Midland, Ont.
Halifax,	13	D. J. Murray,	Victoria Rd., Dartmouth,	Chas. E. Pearce,	Portland Street, Dartmouth, N.S.
Sault S. Marie,	14	Thos. O'Reilly,	153 Queen St.	Geo. S. Biggar,	43 Grosvenor Ave., Sault Ste. Marie.
Charlottetown,	15	J. F. McGuigan,	38 Queen St.	Lem Winchester,	302 Fitzroy St., Charlottet'n, P.E.I.
Twin City,	16	Arthur Abbey	Fort William, Ont.	John A. Smith,	Fort William, Ont.

CAPTAIN INCH OF THE "VOLTURNO" HONORED.

ON Wednesday, Feb. 4, a large and distinguished gathering assembled in the Mansion House to do honor to Captain F. J. D. Inch, whose heroism on the occassion of the burning of his vessel, the steamer Volturno, in mid-Atlantic, in October last, stirred the admiration of the whole world. The story of that burning on the sea is still too vivid in the minds of all to require retelling, but it is interesting to quote the words of the Earl of Desart, in giving judgment at the Board of Trade inquiry.

His Lordship said: "Of the master, Captain Inch, it would perhaps be sufficient to say that he did his duty. To the best of his judgment he did all he could to save the passengers, and to preserve or prolong the life of his ship. He was in the course of the day nearly blinded by a wave of heat. His eyes had to be treated to enable him to carry on, and after the fire, when on board the Kroonland, he was practically blind for several days. His suffering from this injury in no way affected his activity in the performance of his duties till the ship had to be abandoned.

"There is nothing to lessen the force of the commendation which the Court is able to bestow on him in respect of the manner in which he performed his duty in circumstances as trying as any in which a commander could well be placed."

The movement to recognize Capt. Inch's heroism was initiated by a committee of the passengers of the Cunard steamer Carmania. Sir. H. Evan M. James, K.C.I.E., was chairman of the committee, Lady Eliott acted as hon. treasurer, and Mr. Arthur Spurgeon as convener.

The Lord Mayor (Sir T. Vansittart Bowater) presided over the public recognition proceedings, and the large gathering on the platform, in addition to the Lady Mayoress and Captain and Mrs. Inch, included the Chevalier Marconi, Sir H. Evan M. James, Mr. Arthur Spurgeon, Mrs. Buxton, and many others.

The Lord Mayor said that it was a unique occasion. In the ordinary course that presentation would have been initiated by the cabin passengers of the Volturno, but they had all perished. The Carmania was the first ship to come to the aid of the burning ship, and the passengers of that liner had the unhappiness of witnessing the incidents of the disaster. It was thus it came about that a committee of the Carmania's passengers was formed to initiate that movement to recognize Captain Inch's heroism.

When he (the Lord Mayor) was approached by the committee he readily agreed to afford the use of the Mansion House; and he was pleased to have the privilege of doing so. (Applause.) The circumstances of the burning of the Volturno were too recent to require recalling.

How Captain Inch stuck to his duty was shown by the fact that he had no food from Wednesday night to Friday morning.

Chevalier Marconi, who was received with cheers, said he was very glad to have the opportunity of attending that meeting, and to add his word of sincere admiration of the heroism of Captain Inch. (Applause.) It was only natural for him to note that wireless telegraphy and those working it were not found lacking in doing what they were expected to do—(applause)—even to getting into touch with the tanker Narragansett, which came along with her oil. Wireless was also able to send Mr. Spurgeon's splendid account of the disaster. Although we were living in a mechanical and methodical age, our sailors were as true and ready for self-sacrifice as ever they were. (Applause.) His work had brought him into touch with sailors for many years, and their belief in wireless telegraphy had been one of his greatest encouragement.

The Lord Mayor then, amid cheers, made the presentations, which were as follows. Address on vellum:—

"To Captain Francis Inch.

"We ask your acceptance of the accompanying gifts in recognition of your heroism and staunch allegiance to duty during the burning of the S.S. Voltürno in mid-Atlantic on Oct. 9th and 10th, 1913. For upwards of twenty-four hours the lives of more than 500 passengers and crew were in the gravest peril, and but for your coolness and daring, your unfaltering courage and personal sacrifice, the loss of life must have been appalling. You averted a great maritime disaster.

"Lord Desart, as President of the Board of Trade Inquiry into the burning of the Volturno, commended your conduct in the highest terms, and no greater tribute could be paid to any man than the eloquent words he applied to you—'He did his duty.'

"Signed on behalf of the subscribers,

"T. VANSITTART BOWATER,

"Lord Mayor."

"Mansion House, London, Feb. 4th, 1914."

The "Quiver" gold medal for heroic conduct in the saving of life.

A gold watch and chain.

A silver casket to contain a certificate of the Freedom of London, which was conferred the day following by the City Corporation.

Lloyd's silver medal for saving life at sea, awarded by the Committee of Lloyd's "in recognition of his gallant conduct while the Volturno was on fire, and of the number of lives which were saved through his personal exertions and his steadfast adherence to duty."

A purse of gold.

The Lord Mayor then presented to Mrs. Inch a diamond and sapphire pendant and an afternoon tea service in silver. They were proud, his Lordship said, of the great heroism exhibited by her husband.

Captain Inch, who on rising to acknowledge the presentations was greeted with enthusiastic cheers, said it was difficult for him to find words to express his appreciation. That day would remain imprinted on his mind for ever. The kindness and sympathy he had received from all over the world was so great that he could never adequately acknowledge it. He wished to thank Mr. Arthur Spurgeon for all he had done. No one would ever know the time and trouble he had taken in regard to the relief fund for the benefit of the relatives of those who lost their lives in doing their duty.

He had also to thank the passengers of the Carmania, especially Lady Eliott; and also the members of Lloyd's Committee for conferring their silver medal on him. He was most grateful to the Lord Mayor for presiding; it would always be a delightful memory to him (Captain Inch) that he had received these presentations at the Mansion House. He was specially glad to have the opportunity of thanking Mr. Marconi. Had it not been for his wonderful discovery of wireless they could not have secured help. He thanked also the officers and crews of the vessels who came to their aid and made such heroic efforts to help the Volturno (Cheers.) Every member of the crew of the Volturno did his duty like a man. (Applause.) On behalf of his wife he thanked them; that day would never leave their memories as long as they lived. (Loud applause.)

On the motion of Sir H. Evan M. James, K.C.I.E., seconded by Mr. Arthur Spurgeon, a hearty vote of thanks was passed to the Lord Mayor.

In reply, his Lordship said it had been a privilege to him to have been asked to make the presentations.

The proceedings then terminated.

Insurance & Professional DIRECTORY

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A monthly journal dealing with the progress and development of Merchant and Naval Marine Engineering, Shipbuilding, the building of Harbors and Docks, and containing a record of the latest and best practice throughout the Sea-going World. Published by The MacLean Publishing Co., Limited

MONTREAL, Eastern Townships Bank Bldg. TORONTO 143-149 University Ave. WINNIPEG, 34 Royal Bank Bldg. LONDON, ENG., 88 Fleet St.

Vol. IV. Publication Office, Toronto—March, 1914 No. 3

Dredge "Port Nelson" Built by Polson Iron Works Limited, of Toronto

Order placed by Department of Railways and Canals, Dominion Government on the 1st day of April, 1913. Dredge reached Port Nelson after voyage of 3500 miles on the 27th of September.

T. W. No. 1.

The Great North Western Telegraph Company of Canada.

CABLE SERVICE TO ALL THE WORLD.

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Z. A. LASH, President. HEAD OFFICE: TORONTO. GEO. D. PERRY, General Manager.

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213

B2Mo.O.C. 37 Collect

Halifax NS Oct 13th13

Col Miller

Polson Iron Works Limited, TORONTO ONT.

Dredge portnelson in spite of many difficulties encountered enroute arrived safely on Saturday twenty seventh time of passage sydney bar to portnelson bar twenty days six hours. Dredge behaved splendidly throughout voyage congratulste you on output.

H.B.Saunders

1010am

Telegram sent by Captain Saunders, the well-known marine surveyor and wrecking master, who was placed by the Department in full charge of towing of dredge to Port Nelson.

Some Leading Features of the White Star Liner "Britannic"

While no attempt has been made to materially enlarge the main dimensions of the new ship nor to install power equipment to secure increased speed as compared with her sister liner the "Olympic," there are abundantly evident, nevertheless, marked advances in structural detail and arrangement to be noted, all of which have been born of experience in the construction and service of mammoth vessels, and having as their ideal increased seaworthiness, and therefore a higher degree of comfort for passengers and crew.

ON Thursday, February 26, Harland & Wolff launched from their Belfast, Ireland, yard the White Star Royal Mail Steamship Britannic, the second of the name so far as the owners are concerned, and regarded by them, if the name and record of the first Britannic be synonymous, as ominous of successful service performance, combined with immunity from mishap. A large and distinguished company were present at the launch, and, needless to say, with the experience of the builders in this particular feature, the vessel took the water gracefully, and was brought up to her moorings without a hitch in the whole undertaking.

General Data.

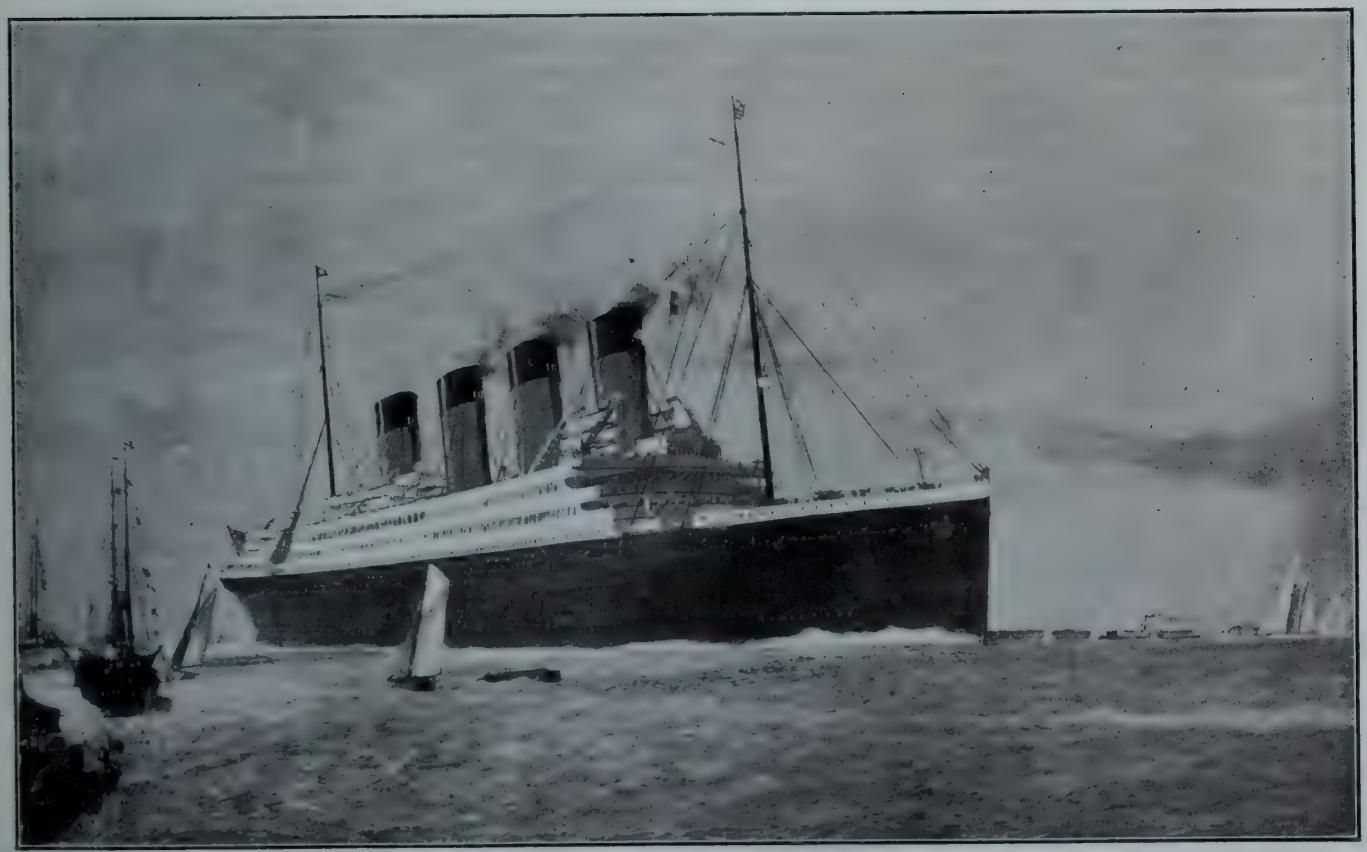
The leading dimensions of the vessel, its tonnage, horse-power, speed, passenger and crew accommodation, etc., are approximately as follows:—

Length over all, 900 ft.
Breadth, extreme, 94 ft.
Depth, moulded, 64¼ ft.
Keel to navigating bridge, 104½ ft.
Load draft displacement, 53,000.
Gross tonnage, 50,000.
Load draft, 34½ ft.
I.H.P. reciprocating engnes, 32,000.
S.H.P. exhaust turbine, 18,000.
Sea speed, 21 knots.
Number of decks, 9.
First-class passengers, 790.
Second-class passengers, 836.
Third-class passengers, 953.
Total passengers, 2,579.
Ship's crew, 950.
Passengers and crew, 3,529.

Launching Features.

The stationary and sliding ways in connection with the launch of the Britannic were some 800 ft. and 700 ft. long, respectively, the corresponding widths of same being 6 ft. 9 in. and 6 ft. 3 in. The declivity amounted to ⅜ in. forward, and ½ in. per foot aft. In the concrete foundation of the berth structure on which these large vessels are built, eyebolts and bearings are imbedded to take tie rods and stays, so as to prevent movement in either direction of the stationary ways. The ship overhung the cradle aft to the extent of about 80 ft., while forward, the overhang amounted to about 50 ft. The average pressure on the ways was about 3 tons per sq. ft.

Hydraulic triggers were used for releasing the ship. In each sliding way there were recesses in which were fitted a cast-steel shoe. Against the back of this there abutted the end of a heavy forging—the trigger—which was pivoted on a fulcrum-pin on a large casting. The latter took the place of the standing ways at such points, being of the same section. The lower end of this forging or trigger abutted against the head of a ram working in a horizontal hydraulic cylinder, 15 in. in diameter with 14-in. stroke. The cylinder was put under pressure preparatory to the knocking out of the bilge and keel-blocks, and the rams maintained the forgings or triggers in a vertical position, thus preventing movement of the sliding ways. To provide against leakage in the pipes, a



THE WHITE STAR LINE STEAMSHIP "BRITANNIC" IN COMMISSION.

hand pump was fitted. When the time arrived for the launching of the ship, the valve was opened, releasing the water from the hydraulic cylinder and permitting the ram to recede. The trigger then fell from the vertical to the horizontal position, so that the sliding ways with the ship were free to move.

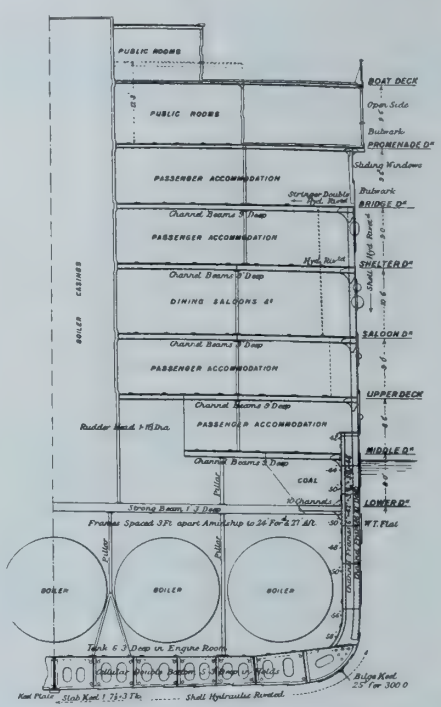
Four 100-ton hydraulic jacks were fitted on each of the stationary ways at the forward end, thrust distributing castings being fitted against the sliding ways, while, at the rear end of the hydraulic jacks, there was a cast iron strong back, held in position by rods attached to eight cast steel anchor blocks imbedded in the concrete foundations of the berth. These tension rods were connected through a series of yokes to equalize the pressure coming upon them. The jacks, which were designed to work at a pressure of 2 tons per square inch by intensifiers acting in conjunction with the yard hydraulic mains, were fitted as a precautionary measure in order to give the ship an impulse in the event of her not moving when released.

The drags consisted of three anchors and one mass of chain on each side of the ship. These latter, which were located nearest the end of the standing ways, weighed 80 tons, while the anchors, which were equally spaced, ranged from 8 tons to 5½ tons in weight. Wire ropes were secured to eye-plates riveted to the shell of the ship when on the ways. The length of each wire rope was so arranged that all checks came into play when the bow of the vessel had traveled a short distance from the end of the stationary ways.

The pressure on the hydraulic ram of the trigger arrangement attained a maximum of 560 tons, and on this being released the ship moved at once; the hydraulic starting-jacks were not required. The time which expired from the beginning of movement until the vessel was afloat was 81 seconds, the maximum speed attained being 9½ knots. The stern dip was 31 ft., and the stem dip 17 ft. The draught of the vessel when afloat was 15 ft. 4½ in. forward and 25 ft. 7 in. aft, which corresponds to a displacement weight of 24,800 tons.

Hull Features.

The hull of the Britannic embraces double bottom construction as far up as the turn of the bilge, and beyond this, to a height of 6 ft. 6 in. above the load water line and extending longitudinally from the after end of the machinery space to the forward end of the boiler-room, there is a watertight inner skin at a distance of 30 in. from the outer shell. The double bottom is 63 in. deep at the centre line of the ship, this amount being increased to 75 in. in the machinery space. The flat keel-plate has a thickness of 1½ in., and below this is a flat slab 3 in. thick and 19½ in. wide. The vertical plate is 1 in. thick, and is connected to the flat keel-plate and to the horizontal plates forming the inner bottom or tank top by heavy angle bars.



S.S. BRITANNIC—HALF MIDSHIP SECTION

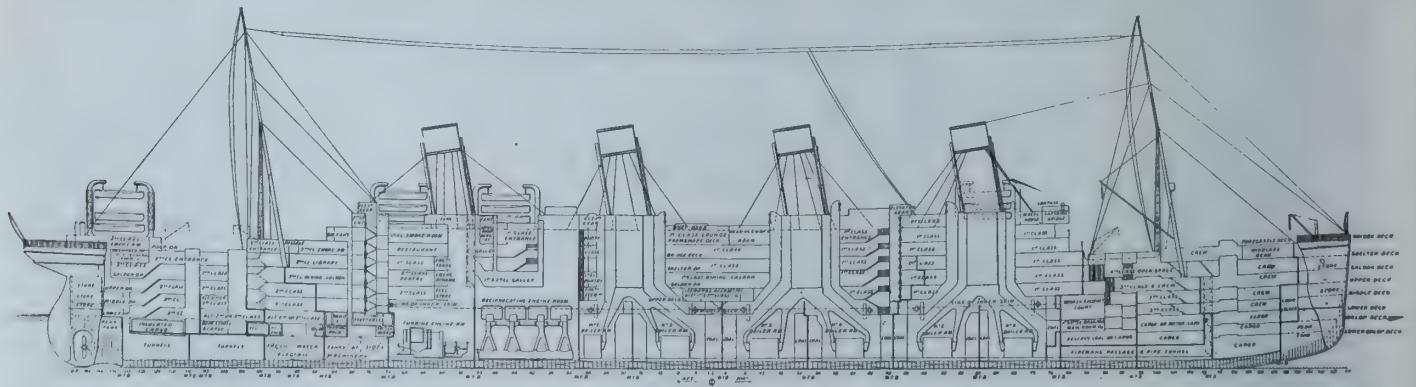
The inner frames of the double skin consist of 6-in. channels placed at 3-ft. intervals, with heavy brackets connecting them to the double bottom. At 30-ft. intervals there are transverse divisions secured by 6-in. channel stays, and midway up the double shell is a horizontal watertight division, with the necessary manholes for inspection and painting purposes. The outer frames extend to the shelter deck, a height of 66 ft., and consist of 10-in. channels spaced 36 in. apart. At the bow and stern, angles and reverse bars are substituted, these being spaced 27 in. and 24 in. apart. Above the double skin, web-frames are introduced in addition to the channels at about 14-ft. intervals, while, forward and aft, the distance between these webs is about 10 ft.

Riveting.

The outer shell of the double bottom was riveted up entirely by hydraulic power, including the bilge-keel. This latter is composed of heavy plates and angles, the depth being 25 in.; it extends over about one-half the length of the vessel amidships. The side plating of the hull was riveted by hand, and, owing to the great thickness of shell necessary, joggling was not resorted to. The laps and also the butts are generally quadruple-riveted. The bridge-deck stringer for one-half its length, the shelter-deck stringer for three-fourths of its length, and the bridge-deck sheer strakes and two strakes below were also hydraulically riveted. There are double butt-straps throughout the whole length of the bridge-deck sheer strake.

Box Girder Principle.

The shell of the ship constitutes three sides of an immense box girder, the frames and shell-plates forming the two sides, and the double bottom the underside. The deck beams and plating constitute transverse stiffeners, while additional strength is afforded by four lines of girders, extending practically from bow to stern, being connected to the bottom flange of the transverse beams carrying the decks. Vertical stiffness is insured by means of steel stanchions 4 in. in diameter between the decks, placed at intervals of 9 ft. in the fore-and-aft line, the distances apart in the trans-


LONGITUDINAL SECTION, WHITE STAR LINER "BRITANNIC."

verse line being 18 ft. The deck-beams are generally 9 in. channels, while the longitudinal girders are 6 in. by 4 in. thick double angles. The deck-beams are secured to the heavy channel-frames by bracket-knees 30 in. deep. The decks throughout are of heavy steel plates with the usual timber planking.

Machinery Space.

In the machinery-room where are located the two reciprocating engines, two lines of girders are fitted on the centre line of the ship, one 43 ft. above the engine-room floor, and the other 22 ft. The upper girder is of the plate type, with heavy flanges, while the lower girder is a double 15-in. channel beam. These are carried at each end on heavy built-up columns 6 ft. wide, while intermediate columns, 15 in. in diameter, are placed at 15-ft. centres along the engine-room. Transverse girders, formed of double 15-in. channels, extend from the port to the starboard side of the engine-room, resting also on the intermediate columns and, at their ends, on heavy built-up columns on the port and starboard sides.

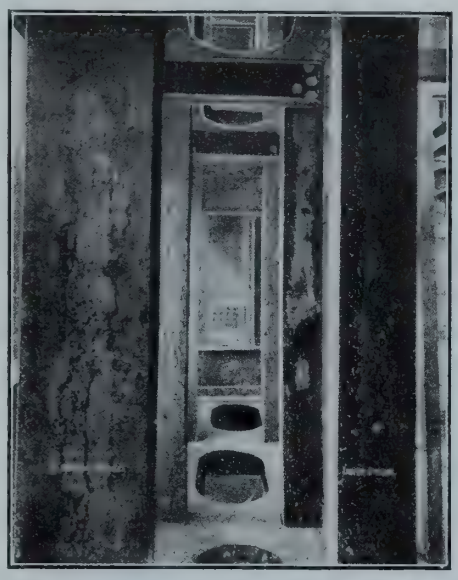
Two girders about 26 ft. apart, extend the full length of the turbine-engine room, and are each supported at the centre of their length by a column 24 in. in diameter. On the lower deck level, at about 33 ft. from the centre line, a girder is fitted on both port and starboard sides with 20 in. diameter supporting columns. The lifting gear for the turbine cover and rotor is supported on deep girders running fore and aft and athwartship. These girders are in turn carried on four strong forged-steel columns attached to the turbine-casing, the load being thus transmitted to the tank top.

In the boiler compartments there are four lines of cast-iron columns placed between the boilers, which are installed athwartships. These columns are at 9-ft. centres in the longitudinal line, and extend to the upper and middle decks. In the case of the two inner rows the columns are splayed at the foot, in order to allow a passage-way between the boilers.

A notable feature is the depth and strength of the coaming-plates for the deck-houses, and it may be noted in connection with the decks that there are three expansion joints above the bridge-deck and one at the level of the bridge-deck aft, where, in earlier ships, there was usually a well.

Bulkheads.

There are sixteen transverse bulkheads, five of these extending to the level of the bridge-deck, which is 75 ft. above the keel, and over 40 ft. above the deepest load-line. The others are carried to the upper deck, which is 56 ft. above the keel and over 21 ft. above the load-line. Where the vertical line of these bulkheads has had to be broken to suit the deck arrangements, water-tight flats have been introduced along the horizontal line. The bulkheads are of $\frac{5}{8}$-in. plating. They are stiffened by 20-in. H-bars, and by 36-in. webs in the lower part of



CELLULAR CONSTRUCTION OF DOUBLE HULL.

the ship, and by bulb-angles in the upper part. Where it has been found impossible, in the interests of the working of the ship, to dispense with doors in these bulkheads, special arrangements have been made for the closing of these doors, either from the captain's bridge or at the door.

Stern Frame and Shaft Brackets.

The stern-frame, shaft-brackets, and lower part of the rudder are of special-quality cast steel, and the rudder-stock of hydraulic pressed ingot steel, the total finished weight amounting to 304 tons. The stern-frame, which weighs 72 tons and measures over all 67 ft. 6 in. high by 37 ft. 5 in. fore and aft, is of dished section, and is made in two pieces, a scarph being arranged on the gudgeon-post and another on the forward post below the turbine boss, with the scarphs secured by 2-in. turned and fitted rivets. The main after brackets weigh 82 tons, and have bosses 5 ft. $2\frac{1}{4}$-in. in diameter by 6 ft. $3\frac{1}{2}$ in. long, the centres of shafts being 41 ft. $4\frac{1}{4}$ in. apart. The brackets are cast in two parts and connected by strong flanges at the centre and secured by seventeen 2-in. turned and fitted bolts. The forward brackets weigh 48 tons, and have bosses 6 ft. 2 in. in diameter and shaft centres of 40 ft. $9\frac{1}{3}$ in. These are also made in two pieces and connected in a similar manner to those of the after brackets. The arms connecting the shaft-bosses to the centre part of the brackets are in both cases of dished section.

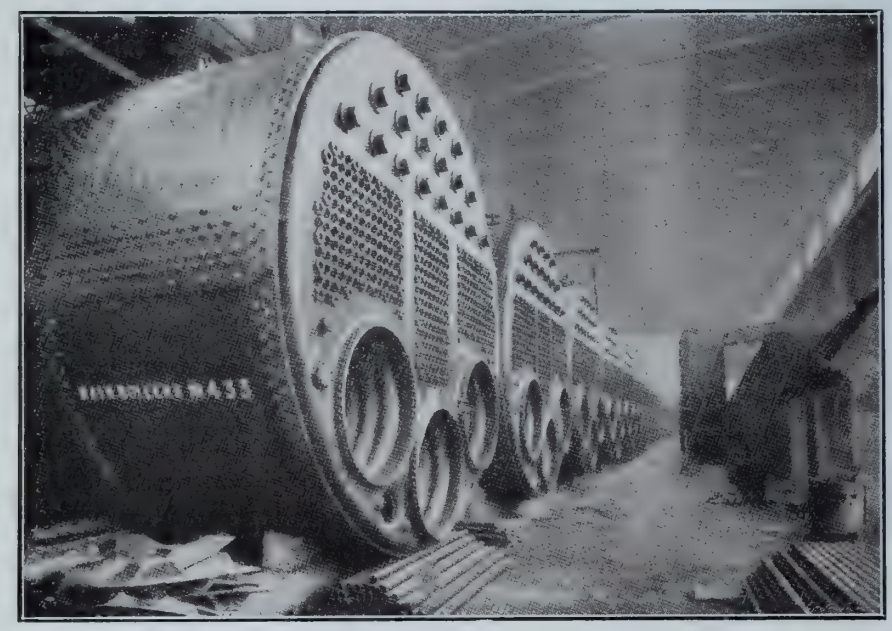
The Rudder.

The rudder is of the solid-blade type, with an over-all length of 73 ft. 2 in., and an extreme width of blade 15 ft. 3 in., the diameter of the rudder-head being $24\frac{1}{2}$ in. The cast-steel blade portion is formed in five segments, coupled together by strong bolt-flanges and secured by about 160 turned and fitted bolts, varying in diameter from 2 in. to $3\frac{1}{2}$ in. The upper part of the rudder is a forging which weighed, when finished, 33 tons, the total weight of the rudder being 102 tons. The rudder is carried by seven special bearing pintles, each 11 in. in diameter. The diameter of the rudder stock is $24\frac{1}{2}$ inches.

FRAMING OF DOUBLE SHELL OF SHIP.

Layout of Decks.

On six of the nine decks, which are exclusive of the orlop deck and tank top, accommodation is provided for 2,579 passengers. There are 140 single-berth rooms for first-class passengers, and 96 double-berth rooms, and in practically all cases each room is arranged with a bath-room and w.c. attached, while by the adoption of tandem rooms the great majority of the cabins have natural light and ventilation. There are 31 suite-rooms on the bridge-deck and 40 on the shelter-deck, in addition to a specially-arranged suite of rooms on the bridge deck having a sitting-room, two bedrooms, bath-room and w.c., and an isolated deck promenade, 48 ft. long, on the port side. In a corresponding position on the starboard side there is another suite, with sitting-room, two bedrooms, servants' rooms, two bathrooms and two w.c.'s, and, instead of the promenade, a veranda about 24 ft. long. On the shelter-deck below there are four suites of rooms, equally capacious, but without the isolated promenade and veranda.



BOILERS OF THE "BRITANNIC" IN THE SHOP.

The Boat Deck.

The boat-deck, which is about 60 ft. above the water-line and about 95 feet. from the keel, has a length of about 500 ft. amidships. At the forward end is the navigating-bridge, and on the roof of the captain's bridge is placed a standard compass. Adjacent to it are the quarters for the officers, including a large sitting room, which may serve either as a dining-room or smoke-room. Abaft of this is the first-class companion-way, along with three elevators, extending from this level right down through all the decks accommodating the first-class passengers. In addition to this, there is aft a corresponding companion-way for first-class passengers, while in a separate intermediate position is a fourth elevator. On this level also there is, on the starboard side, the gymnasium, 46 ft. by 17 ft. An engineers' smoking room alongside the engine casing with a stairway to the quarters below, and a promenade space are new features.

Promenade Deck.

The promenade-deck is slightly longer than the boat-deck, and is given up to first-class public and staterooms and a promenade for the same class. The deck-house extends almost from end to end, and at the forward end there are arranged a large number of state-rooms, most of them suite-rooms. Abaft the first-class entrance is the reading and writing-room and the first-class lounge, the latter occupying 58 ft. of the length of the deck-house. Beyond this is the first-class smoking-room, with a veranda cafe and palm court abaft it. Aft on this level there is the roof of a large deck-house on the poop, on which there is accommodated the fourth group of lifeboats.

Poop Deck, Etc.

The poop-deck, bridge-deck, and forecastle deck, is the next level, and this is continuous from bow to stern, with the exception of a well abaft the forecastle, which is 126 ft. long. There are the usual anchor and warping arrangements on the forecastle head. The bridge-deck and poop extend right aft, without any well, which is a departure from former practice. The central part of the deck-house on this level is carried right to the side of the ship, there being a first-class promenade forward only, and here also the side plating of the ship is carried up with large windows in order to afford shelter to the passengers. The greater part of the deck-house is given up to first-class staterooms, and here again all the rooms have bathrooms and w.c. attached.

In the after end there is a restaurant the full width of the ship, with a reception room adjacent to it on the starboard side. On the port side there is a separate galley, pantry, etc., for the restaurant. On this deck there is also a ladies' hair-dressing saloon, a barber's shop, and a manicure establishment. The second-class smoking-room is arranged on this level about 200 ft. from the stern of the ship. Abaft it is the second-class companion-way and elevator, and adjacent is the second-class smoking-room, with large space outside for a promenade for second-class passengers. On the poop there is a third-class smoking room, with an extensive promenade for third-class passengers.

Shelter and Saloon Decks.

The shelter deck extends right fore and aft, and under the forecastle head are located the windlass and anchor gear as also part of the crew accommodation. On this deck a large number of first-class staterooms, the second-class library and writing-room, second-class promenade, third-class public-rooms, third-class promenade and isolation hospitals are features. At the extreme aft end, the steering gear is placed.

On the saloon deck, the first and second-class dining-rooms, with seating accommodation for 518 and 346 passengers respectively, a first-class reception-room, first and second-class staterooms, a maids' and valets' saloon, galley and pantries, are located. On the upper deck right forward, accommodation is provided for seamen, trimmers, greasers, etc., while further aft on the starboard side are first-class staterooms, and, on the port side, quarters for waiters, stewards, petty officers, etc. Near to the engine-room casing, are the engineers' quarters, with their mess-room and pantry. Further aft are more rooms for second-class passengers.

Middle, Lower and Orlop Decks.

On the middle deck there is accommodation for firemen and third-class passengers, a swimming pond, Turkish and electric baths, squash racquet court, etc. Amidships are the two third-class dining saloons, with seating accommodation for 423 passengers, while further aft are second and third-class passenger rooms. On the lower deck forward are firemen's rooms, and abaft are second and third-class passenger staterooms. Forward is the post office, and aft the refrigerating stores, while in the stern are more rooms for third-class passengers.

On the orlop deck forward are the chain locker, cargo holds, baggage rooms, mail

rooms, and, in the extreme after end of the ship, the stores and refrigerated cargo holds. The tank top or hold of the vessel is given up to cargo, and aft of the boiler and engine rooms there is arranged the electric power station over the centre shaft tunnel.

Propelling Machinery Equipment.

The propelling machinery equipment of the Britannic consists of two sets of 4-cylinder, triple expansion type reciprocating engines balanced on the Yarrow-Schlick-Tweedy system, having the low pressure cylinders placed at either end, and of a Parsons marine type exhaust turbine, the latter driving the centre screw and each of the former driving a wing screw. The turbine is the largest yet constructed. All the manœuvring is done by means of the wing propellers, the reciprocating engines being suited for astern as well as ahead driving, and the manœuvring gear enabling the turbine to be thrown out of action, so that the steam passes from the reciprocating engines direct to the condensers. In this way there is available for astern drive the full power of the reciprocating engines, which on each shaft equals 16,000 horse-power. The turbine-engine, running at normal speed ahead, gives 18,000 shaft horse-power, so that the power for ahead driving is 32,000 indicated horse-power in the two reciprocating engines and 18,000 shaft horse-power in the turbine.

Each of the reciprocating engine sets have cylinders of 54-84-97-97 inches diameter with a stroke of 75 inches, while the working steam pressure is 215 pounds per sq. inch. When developing their full power each engine runs at 77 r.p.m.. Full power is developed on the centre shaft, with the turbine running 170 r.p.m.

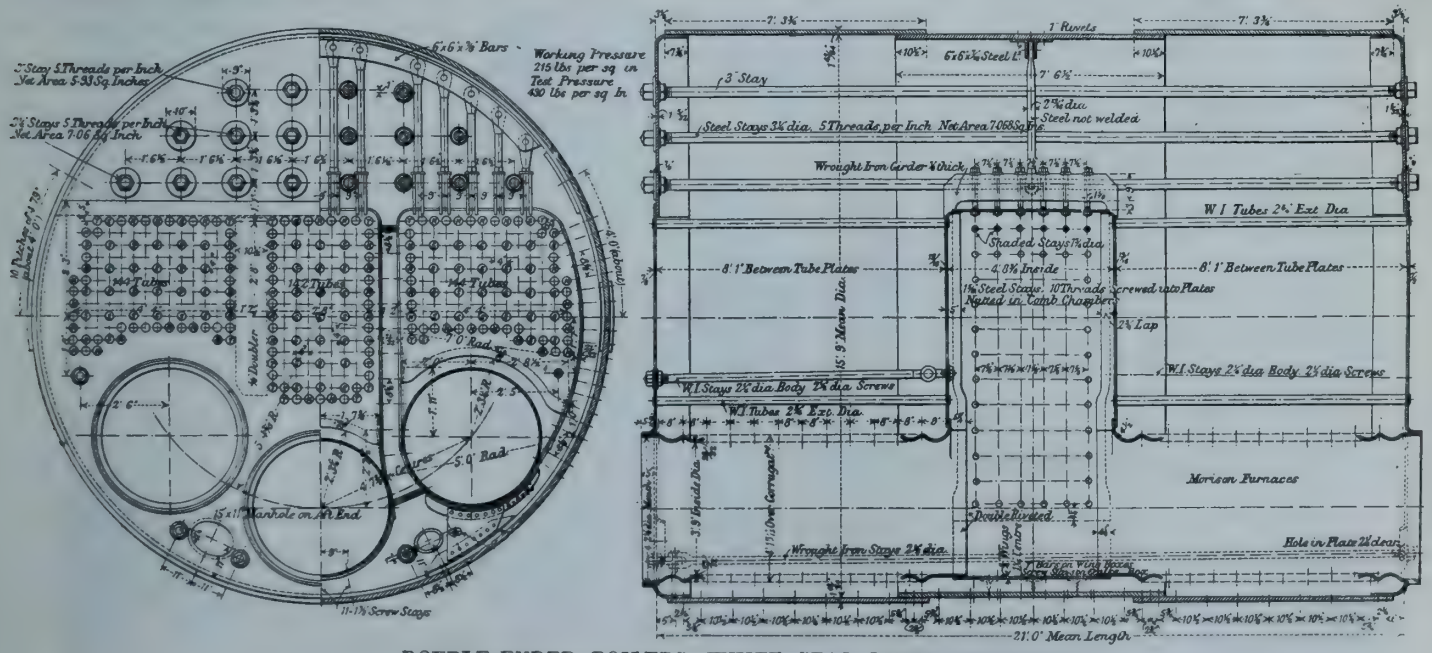
There are six boiler rooms in the vessel, housing in all, 24 double ended and 5 single-ended boilers. The double-ended boilers are each 15 ft. 9 in. diameter by 21 ft. long, while the single-ended boilers are of the same diameter as the others, but 11 ft. 9 in. long. The working steam pressure is 215 pounds per sq. inch, and the hydraulic test pressure 430 pounds per sq. inch. Six Morrison type furnaces are installed in each of the double-ended boilers, and three in each of the single-ended boilers, the inside diameter of these furnaces being 45 inches. The firebars are of the rocking type. The heating surface and grate area in each double-ended boiler are 5,702 sq. ft., and 130.8 sq. ft. respectively, while for each single-ended boiler, the corresponding figures are 2,822 sq. ft. and 65.4 sq. ft. There are in all 159 furnaces, 150,958 sq. ft. of heating surface, and 3,461 sq. ft. of grate area.

Electric Power Station.

The electric power station is abaft the main machinery space in the centre of the ship, and is arranged in two watertight compartments; the walls, although far from the shell-plating, as well as the floor and roof, are capable of excluding water.

In each of the two compartments there are two 400-kw. steam sets. All four sets are alike, and have been supplied by W. H. Allen & Co., Ltd., Bedford. The steam-engines are of the three-cylinder compound enclosed type, with cylinders 17 in., 20 in., and 20 in. in diameter by 13 in. stroke, and these drive at 325 revolutions per minute compound-wound dynamos, of the direct-current type, of 4000 amperes, with a pressure of 100 volts. The four sets work in parallel. Roughly, one machine deals with the lighting of the ship, and two with the demands for power and heating, while one is a stand-by. The switchboard is arranged on a gallery, and there are two distinct bus-bars, one for power and one for lighting.

In addition to these there is an emergency plant, located on the promenade-deck, and consisting, in this case, of batteries with a capacity of over 4000 ampere-hours at a ten-hour rate. These batteries are always on the bus-bar, so that in any emergency, if the main sets are shut down, all the lines distributing current throughout the emergency circuit would remain in action. The boat-lowering appliances can also be worked from the batteries, as well as signals, the Marconi apparatus, and the electric-whistle control. In addition to this battery system there is located on the saloon-deck, and, therefore, far above the load water-line, an auxiliary power plant, complete in every respect, with two 30-kw. Allen steam-driven sets, which will be used for charging the accumulators when current is being taken from them, as well as for running direct the emergency circuit. These emergency sets, too, will suffice for providing current for use when the ship is in port, but their chief function is, of course, the charging of the accumulators. —Condensed from ' Engineering."



DOUBLE-ENDED BOILERS, WHITE STAR LINER "BRITANNIC."

"Calgarian" Sea Trials.—The new Allan liner Calgarian has completed its long-distance sea trials from the Clyde to Land's End. Despite the bad weather prevailing for the greater part of the trip, the average speed attained on the whole run was 19.6 knots. On the return passage, the palatial new liner met with more favorable weather and attained a speed of 21.6 knots.

NEW CAR FERRY ORDERED.

A CONTRACT has been placed by the Ontario Car Ferry Co. with the Polson Iron Works, Toronto, for a car ferry to run between Cobourg, Ont., and Charlotte, N.Y. This car ferry is identical in design to that illustrated, and which has been in service for some years between these ports, and will be used for the same purpose., viz., carrying coal, etc. The ferry will be of the shelter deck type and built of steel, with four car tracks on the main deck, while on the shelter deck there will be accommodation for a few passengers, officers and crew. The vessel will have six transverse bulkheads extending from keel to main deck, and longitudinal bulkheads on centre line in three deep water ballast tanks. Her capacity will be 28 standard coal cars of 68 tons gross weight each and 200 tons of coal in bunkers. The mean draft fully loaded will not exceed 16 ft. 3 in. The normal speed in open water will be 13 m.p.h. The scantlings, etc., will be to Great Lakes Register highest classification. The principal dimensions are as follows:—Length over all, 318 ft.; length between perpendiculars, 307 ft. 6 in.; beam, moulded, 54 ft.; on main deck, 56 ft.; depth to main deck, 20 ft. 6 in.; depth at centre, main deck to promenade deck, 17 ft.; depth at side, main deck to promenade deck, 17 ft.; draft, with 28 loaded cars of 50 tons capacity and 200 tons coal, not to exceed 16 ft. 3 in.; camber of main and promenade decks, 9 in.; rise of floor 2 ft.

Main Engines.

The ferry will have twin screws, each being operated by a triple expansion, jet-condensing engine, having cylinders 20½×33×54 in. by 36 in. stroke. The engines will run about 110 r.p.m. on a steam pressure of 180 pounds. The valve gear will be of the link type, controlled by a steam reversing gear.

The boilers will be four in number and of the Scotch marine type, each being 14 ft. diameter by 12 ft. long. They will be equipped with the "Howden" system of forced draft. Each boiler will have three corrugated steel furnaces, 42 in. inside diameter, with separate combustion chamber for each.

Pumping Equipment.

The boiler feed will be taken care of by two 12×7×12 in. duplex, outside packed plunger, pot valve pumps, while a pump of the same type and size will be installed as a general service donkey pump. The bilge and sanitary pumps will be duplex type, 6×5×7 in., and the fresh water pump will be 4½×4×5 in., while a pump of the same size will be used for the main injection. There will be three ballast pumps installed, two duplex type, 12×16×18 in., and one 12 in. centrifugal pump. A multi-tubular feed water heater will be installed in the feed pump discharge line.

Lighting Plant.

A complete electric light plant will be installed, consisting of one 15 k.w. and one 20 k.w. direct connected marine type generating sets. The different parts of the ship will be lighted by electricity throughout. In connection with the store rooms there will be a 2-ton refrigerating plant of the carbonic anhydride type. A wireless outfit will be installed.

RECENT VESSEL PURCHASES.

THE Pittsburg Steamship Co. on March 2, accepted the offer of the Reid Wrecking Co., for the steamer Matoa. When bids were opened, the highest offer was $3,000. The Reid Wrecking Co. refused to accept this bid, as they had a half interest in the ship acquired by releasing her from Point aux Barques, where she went ashore November 9; they therefore made an offer approximately 70 per cent. higher, and secured the vessel. This makes the second wreck brought by the Reid Wrecking Co. recently. On Feb. 28, the underwriters' representatives sold the steamer Nicholas to them for $6,000, subject to the approval of the underwriters, and will pay $35,000 for salvaging the ship.

Adam McKay, of Hamilton, Ont., is reported to be a probable purchaser of both the Matoa and Nicholas after they are put in seaworthy condition. The Nicholas will probably be cut to Welland Canal size. Mr. McKay also has a two-thirds interest in the steamer F. M. Peck, which was bought by the Reid Co. at a marshal's sale. The Peck was wrecked by a boiler explosion at Racine, Wis., last season. Mr. McKay has also purchased the wooden steamer Byron Whitaker from the George Hall Coal Co. according to reports received.

The Algoma Central Steamship Co., of Sault Ste. Marie, Ont., has, it is understood, bought the steamer J. A. McKee from the Western Steamship Co. of Toronto, of which W. J. Bassett is managing director. The McKee is a steel ship of 3,500 tons capacity, full Welland Canal size, and was built in 1908.

ONTARIO CAR FERRY CO. STEAMSHIP "ONTARIO NO. 1."

CANADA'S ATLANTIC SEABOARD

Shipping and Shipbuilding Enterprises and Industries are Again in the Ascendency in Our Maritime Provinces, and Revival of the Old-Time Activity Appears Imminent

CANADIAN STEAMSHIP SERVICE RIVALRY.

ACCORDING to a Government official, there are to be great doings in the way of Atlantic transportation this year. All the steamship companies, the official says, have notified the Government that it is their intention to run a weekly service from Canada to the Old Country, and this will mean that a large number of additional boats will be steaming up the St. Lawrence this summer, and also that the competition between the various companies will wax fiercer than ever before.

The Allan Line had six steamers last year sailing to Montreal from Great Britain, this year a further two will be added, and it is stated that while four will sail from Glasgow, four (the Virginian, Victorian, Calgarian and Alsatian) will sail from Liverpool, all with their terminus at Montreal.

The White Star Line had three steamers in commission to Montreal in 1913, and to give a weekly service they will increase the number to four.

C. P. R. Will Lease Two Boats.

With regard to the C. P. R. there is an interesting development. They have the keels of two new boats being laid at the present time, but, so that they will not be out of the running, they intend to lease two boats from some other line until such time as the new ones are completed, and they have notified the Government that they intend to run a weekly service to Montreal with the two Empress boats and the two boats that they will lease. The Trieste service will also be augmented, an additional boat being added to the three already on that route.

It has also been stated that the Hamburg-American Line will have a service of four boats running to and from Montreal this year.

The C. N. R.

The Canadian Northern have at present the two boats of the Royal Line, the Royal Edward and the Royal George. Rumors have been current to the effect that they intend to build two new boats, but the latest development is of even greater interest, in view of recent events. Two statements are made:

In the first place, that the C. N. R. intend to establish a weekly service, as the other companies will do, and that they will get two "second-hand" boats from one of the lines (such as the Donaldson Line), which are in the Redford Agency. The other statement, is to the effect that the Royal Edward and the Royal George will be absorbed into another company, and run under that company's flag, while at the same time the C. N. R. will draw a considerable portion of the profits, the company running the C. N. R. boats in conjunction with their own, but acting as C. N. R. agents.

Shortage of Boats.

It is quite evident that this prospective increase of no less than eight boats (not counting the four new boats of the Hamburg-American Line) will mean a shortage somewhere, and the problem presents itself as to where all the boats are to come from, if there is not to be a cutting-down on other routes.

THE LATE HON. WILLIAM RICHARDS.

ONE of the pioneer leaders in the industrial and mercantile life of Eastern Canada passed away on February 16th, last in the person of the Hon. William Richards, of Prince County, Prince Edward Island. Had he lived till May 15th next, he would have been 95 years of age.

The deceased gentleman was the father of Mr. James W. Richards, M.P., for

THE LATE HON. WILLIAM RICHARDS.

Prince County in the Federal Parliament; of Mr. John Richards, M.L.A. in the P.E.I. Legislature for the same constituency, and of Mrs. W. McLea Walbank, widow of the prominent Montreal engineer. He came to Montreal in November last and it was there that his busy life came to a sudden end.

The late Hon. Wm. Richards was born in Swansea, South Wales, in 1819, and was educated both there and in Waterford, Ireland. Like many of his countrymen, he spent his early life at sea, and in fact was in command of a square rigged ship at the early age of twenty-five. Coming to Prince Edward Island a few years later, he went into the shipbuilding business at Bideford in company with the late Hon. James Yeo, whose daughter he married and whose son is now Senator Yeo, a prominent member of the Upper House of the Canadian Parliament.

No less than one hundred ships, ranging in size from 500 to 1,500 tons, were built for him and launched from this historic yard; and in those early days the Bideford sailing ships were to be met with on every sea, and constituted a very considerable portion of the merchant marine of British North America. These ships were of barque and brigantine rig and carried large cargoes on a very light draft.

The late Captain was a contemporary of the Popes, the Conolys, the Lairds, the Yeos and a great many more whose names were famous in the public and commercial life of Prince Edward Island. About the year 1870 he entered the Provincial Parliament, where for several years he faithfully served his constituents and the Province generally. Although he always refused to hold office, his name was closely identified with a great deal of legislation in the Province, both before and after Confederation took place. He was a warm supporter of the Union, and although he came to Prince Edward Island so many years ago, when the individuality of each Province was much more strongly marked than it is to-day, he was always a broad Canadian and a firm believer in the ultimate destiny of the Dominion and above all of the British Empire.

Apart from the ship building industry, the late Hon. Wm. Richards was identified with everything that would contribute to the development of Prince Edward Island. He was president of the Charlottetown Steam Navigation Co. up to the day of his death, his interest in the Company's general policy, as well as in matters of detail, never flagging up to the last days of his eventful career. During his many visits to Montreal his face was

a familiar one on St. James Street, his quickened step being that of a man of sixty rather than of fourscore years and ten. His genial smile and agreeable manner won him many friends, all of whom knew him as "The Grand Old Man of Prince Edward Island."

OCEAN FREIGHT RATES.

"THIS is the biggest issue in the life of Canadian trade and commerce," said I. B. Wood, of Hamilton, at the Associated Boards of Trade meeting a few days ago in urging that the Government take action to reduce ocean freight rates. "The combine which controls ocean freight rates is the greatest and most iniquitous in the world to-day. It is driving wheat out of the country to be milled, for the reason that 8¾ more cents is charged for flour than wheat. The life of trade and commerce is being sapped, but this is not an age of slavery and serfdom and the remedy is in sight.

"I would suggest that the Government spend $5,000,000 in establishing a line of steamers to combat the high rates."

The resolution under discussion was: "That the Ontario Boards of Trade strongly urge the Government to immediately appoint a commission for the purpose of investigating the excessive charges in ocean rates and to take further action which will result in the appointment of a permanent commission with power to control and regulate such rates?"

The original resolution was changed to read that "Whereas the report of the commission shows that there is a combine, we urge that the Government establish a line of ocean freight boats."

ATLANTIC VOYAGERS TAKE NOTE.

"THE best and steadiest ship in a seaway I have ever been in. We had very trying and heavy weather on both the outward and homeward passages, and she behaved splendidly. I can imagine nothing better afloat. You cannot say anything too good of the ship." Thus spoke Capt. Outram, the commander of the new Allan liner Alsatian, on the vessel's arrival at the landing-stage on completion of her first round trip.

On account of the heavy weather and fog experienced, no record runs were attempted, nor indeed would record breaking have been sought, as ships on the first voyage are judiciously "held back" somewhat. The Alsatian was slowed down a good deal owing to the above reasons, and her passage was naturally prolonged well over the time she would have normally taken in making the run across.

On the ship's arrival at Halifax, according to Mr. Green, the ship's purser, everybody in the "Liverpool of Canada" seemed to have turned out to witness her coming, although she docked very early in the morning. During her stay at Halifax she was thrown open for inspection, and over a thousand people a day admired her splendid appointments, while the senior officers of the ship were invited to enjoy the full privileges of the Halifax and other well-known clubs, and treated generally as guests of the town. Capt. Outram was also the recipient of an illuminated address from the townspeople of his native place, Sydney, C.B., the address, it is interesting to note, being presented by Capt. James Townsend, who commanded, many years ago, one of the old Allan sailing vessels.

WIRELESS TELEGRAPHY ON CANADIAN VESSELS.

THE majority of Canadian vessels coming under the Act providing for the compulsory installation of wireless telegraph equipment, and which became effective with the advent of the new year, have already been so fitted. The following is a list of Canadian registered ships which have been equipped for wireless telegraphy by the Marconi Company:—

Pacific Coast.

Dominion Government vessels—Estevan, Malaspina, Galiano, Newington, Quadra and Rainbow. Union Steamship Co.—Camosun and Chelohsin. B.C. Salvage Co.—Salvor. Grand Trunk Pacific Co.—Prince Rupert, Prince George, Prince John and Prince Albert. C.P.R.—Princess Adelaide, Princess Alice, Princess Charlotte, Princess Victoria, Princess Beatrice, Princess Ena, Princess Royal, Princess Sophia, Tees, Princess Patricia and Princess Maquinna.

Newfoundland and Atlantic Coast.

Reid Newfoundland Co.—Bruce, Invermore, Kyle, Lintrose. Harvey & Co.—Bellaventure and Bonaventure. Job Bros.—Beothic and Nascopie. C.P.R.—St. George. Canada Atlantic and Plant Line—A. W. Perry, Evangeline and Halifax. Boston and Yarmouth Steamship Co.—Boston, Prince Arthur and Prince George. Dominion Coal Co.—City of Sydney, Douglas H. Thomas and Morwenna. W. A. Farquhar—Steamer Seal. Holliday Bros.—Aranmore. Quebec Salvage and Wrecking Co.—Lord Strathcona. Dominion Government—Aberdeen, Margaret, Acadia, Canada, Dollard, Druid, Earl Grey, Lady Grey, Lady Laurier, Lurcher, Minto, Montcalm, Montmagny, Niobe and Stanley.

Great Lakes.

C.P.R.—Alberta, Assiniboia, Athabasca, Keewatin, Manitoba. Northern Navigation Co. — Hamonic, Huronic, Noronic, Saronic. Canadian Towing & Wrecking Co.—Empire and Province. Dominion Government—Simcoe.

HALIFAX HONORS CAPTAIN INCH.

CAPTAIN FRANCIS D. INCH, the gallant young commander of the Uranium liner Volturno, when that ship was burned at sea on the 10th of October, 1913, was accorded an enthusiastic and genuine welcome to Halifax, when he arrived in command of the new Uranium liner Principello, recently. The suggestion made by the "Morning Chronicle" had its full fruition when, before an audience that completely filled the Council Chamber of the City Hall, and packed the corridors and stairways, Captain Inch was presented by the citizens of Halifax with a suitably engraved silver loving cup and an address of welcome.

Accompanying the captain were the only two surviving officers of the Volturno, Second Officer Lloyd and Third Officer Dusselman. As the three men entered the chamber, escorted by Mayor Bligh, there was a spontaneous and genuine outburst of welcoming applause. Mayor Bligh read the civic address; his Honor Lieutenant-Governor MacGregor extended the welcome of the province of Nova Scotia; and Captain Inch replied with a few well-chosen sailor-like remarks appreciative of the honor conferred upon him. At the conclusion of the ceremony, Captain Inch stood outside of the main doors of the Council Chamber and received a long line of citizens, many of whom were unable to gain admittance to the chamber owing to the crush.

The entire reception was excellently carried out by the civic authorities and the representatives of the Board of Trade. It was a reception accorded to a man who "simply did his duty," but for genuine expression of appreciation of a brave man's conduct in the face of overwhelming odds, it could not be excelled. The whole spirit of the function was significant of that appreciation. It was a memorable incident in the annals of the city, the history of which is so redolent of the romance of shipping. In welcoming Captain Inch, Halifax paid tribute to the host of heroic men who have sailed from the shores of Nova Scotia, and in all the seven seas upheld the glorious traditions of British seamanship.

At the City Hall.

Long before the hour set for the reception, the City Hall was the centre of a rapidly increasing crowd of people. Captain Inch, who had arrived the previous evening on the Principello, the new ship of the Uranium line, of which he has been made commander, was met at the terminals by Deputy Mayor Powell, representing the City Council, and H. R.

Silver, representing the Board of Trade. Mr. P. Mooney, agent for the line at Halifax, was on board the ship to present Captain Inch. Immediately after, the four drove to the City Hall, accompanied by a number of cabs conveying immigration and terminal officials to witness the ceremony.

At the City Hall, the centre of the Council Chamber was reserved for representatives of the Local Government, among whom were Hon. George E. Faulkner, and R. E. Finn, M.P.P.; representatives of the army and navy, Col. Fages, Col. Sircom, and Col. Humphrey, Commander Martin, Dr. Rosseau, of the Niobe. Lieutenant Governor MacGregor was seated on the right of the Mayor, Captain Inch being seated tn his Worship's left. Members of the City Council occupied their customary seats. In the audience were many well-known captains, Captain Murray, of the Empress of Ireland, being one. The shipping interests of the city were well represented, and the terminal officials were present almost in a body. Prominent from the Immigration Department were Immigration Agent W. L. Barnstead and Assistant Agent Hetherington, while many of the spectators were ladies.

The Address of Welcome.

Mayor Bligh read the following address of welcome:—

To Captain Francis D. Inch, of the S.S. "Principello."

On behalf of the citizens of Halifax, we take the opportunity of your first visit here since the memorable disaster to the S.S. "Volturno" to express our sincerest admiration of your conduct on that occasion.

Of all marine disasters, a fire is the worst, and when it occurs in a ship freighted with human lives, it rises to heights of tragedy absolutely appalling.

The history of the sea contains no tales more tragic and fearful than that of the losses of passenger ships by fire. Among these the loss of the "Volturno" will ever hold a foremost place by reason, not so much of the loss of life, great though that unfortunately was, but by the intensely dramatic circumstances with which it was surrounded. That the loss of life was not far greater, extending even to every soul on board, was due in part to Marconi's wonderful invention, in part to the courage and skill of the rescuing crews, and in an equal degree to the humanity, courage, skill, and devotion to duty of the man immediately responsible for the management of the burning ship, and the control of her passengers and crew.

To so fight the fire through those dreadful hours of storm and suspense, and so manoeuvre your ship as to make life possible on board of her, and to so control the panic-stricken passengers that rescue was made possible, required not only skill, but courage and moral power of the highest order, and it is because under such cruel conditions all these qualities, the highest qualities possibly that man possesses, were displayed by you, that we tender you this reception, and beg you to accept the accompanying small token of our appreciation.

Inscription on Cup.

The silver cup bearing the following inscription was then presented:—

"Presented to Captain Francis D. Inch by the citizens of Halifax, Nova Scotia, in admiring recognition of his gallant and heroic conduct during the loss at sea by fire of the steamship Volturno, October 10, 1913."

The body of the address was in old Roman lettering and the city crest was reproduced in colors, while a seascape was also shown.

Capt. Inch's Reply.

Litutenant-Governor MacGregor then extended the welcome of Nova Scotia. Captain Inch, in responding to the words of welcome in a typically sailor manner and lacking any hint of self-praise for his own work, said:—

"Mr. Mayor, ladies, and gentlemen, it is indeed difficult for me to express my appreciation of the honor you have done me in giving me this civic address and handsome cup in recognition of my humble endeavors to save the lives of the passengers and crew of the ill-fated Volturno. The kindness and sympathy shown me from all over the world has been so great that I do not know how to express my thoughts and my thankfulness. The fact that so many lives were saved is due first to Mr. Marconi, but for his wonderful discovery of wireless telegraphy we should have all perished, and secondly to the brave crews of the ships of so many different nationalities who came so nobly to our rescue in response to the wireless calls for help, who, when they arrived, did not hesitate to at once launch boats on the terrible sea and try to reach us, only to be driven back time after time, until at last their courage and endurance triumphed and they were able to reach us and rescue us, thus showing the world that race, nationality, and creed are forgotten when there are human lives in danger at sea. I thank you all from the bottom of my heart for the honour you have conferred upon me today, and I shall never forget it as long as I live."

At the close of the speech, Deputy Mayor Powell called for three cheers for Captain Inch, which were given with enthusiasm and vigor by the assembled citizens, all of whom had felt even more drawn to the youthful captain since they had seen and heard him.

JAMES PLAYFAIR BUYS MORE BOATS.

ACCORDING to advices from Cleveland, Mr. James Playfair, formerly of the Canadian steamship merger, who is establishing a new line to be operated as an independent company, has purchased the steamers Wawatam, La Salle and Griffin from the Pittsburgh Steamship Co.

It is understood that Mr. D. T. Helm, of Duluth, acted as agent for Mr. Playfair. In addition to the deals already consummated, it is intimated that other boats will be acquired for Mr. Playfair within the next ten days. A few weeks ago Mr. Playfair acquired two large passenger and freight steamers from the Chicago and Duluth Transit Co., which he will operate between Port Colborne and the head of the lakes. The steamers La Salle, Griffin and Wawatam are all the same size, the dimensions being 266 feet long by 38 feet wide, with a draught of 23 feet.

Respecting the demand for freighters on the market for sale, a despatch from Cleveland says: "It is a question of price in some instances. With two profitable seasons behind them and the outlook for the current year slow at the opening, but with good prospects of activity when the season gets into full swing, boat property is being held at higher prices than prevailed a year ago. In many instances prospective buyers consider prices asked are out of proportion with the cost of new vessels, and may wait until next fall to order boats for spring delivery."

The Industrial Harbor is the title of a very interesting and well-arranged catalogue which we have received from Deutche Maschinenfabrik A. G. (Demag) Duisburg, Germany. The catalogue contains a large number of illustrations of loco cranes, floating cranes and discharge bridges, in fact, views of practically all the lifting and transporting appliances that might be required in any harbor or dock. Views of a patent railroad car dumping appliance are also shown. The illustrations are exceedingly good and are reproduced from photographs taken of the various appliances in operation. The catalogue contains 152 pages, and is well bound with an attractive cover. Copies may be obtained, by interested readers, from the Canadian sales agents, Gerald Lomer, Ltd., Fraser Building, Montreal, Que.

Out of Respect.—The plant of the Canadian Westinghouse Co., Hamilton, Ont., was closed all day Saturday, March 14, out of respect for the life and work memory of the late George Westinghouse.

GREAT LAKES AND ST. LAWRENCE

Water Transportation From the Atlantic to the Heart of Canada is one of the Live Issues of our Time and is Daily Becoming of Increased Importance

CANADIAN SHIPBUILDING WANTS GOVERNMENT AID.

A DEPUTATION representing the shipbuilding industry waited upon Premier Borden and members of the Cabinet on March 4 and urged Government co-operation in the development of shipbuilding in Canada. The following were included in the deputation:—Thomas Long, Toronto; Capt. McDonald and R. B. Wallace, of Port Arthur; J. Sword, of Kingston; P. L. Miller, of the Canadian Vickers, Montreal; J. B. Miller, of Toronto; Thomas Hall, of Montreal, and George Davie, of Quebec.

It was urged by the members of the deputation that as the plant of the companies represented a heavy investment, every effort should be made by the Government to throw business their way. In recent years, it was pointed out, the Government had placed orders for dredges, etc., outside of Canada. It was urged that in the future the Government place all such orders with Canadian firms.

Some objection was also taken to the fact that the Government, though professing to encourage Canadian shipbuilding on the part of others, had gone into the business itself, and in many cases had vessels built at the Sorel shipyards. Some of the members believed that the Government should not be in the business now that the industry had become pretty firmly established.

"ACADIAN" CAPTAIN CENSURED.

ACCORDING to a finding issued by Commander H. St. G. Lindsay, Dominion Wreck Commissioner, who investigated the stranding of the steamer Acadian of the Canadian Interlake Line, Limited, of Toronto, Captain Robert McIntyre is severely censured for his error and lack of judgment, but on account of his subsequent conduct respecting the salving and refloating of his vessel, his certificate is restored to him.

Commissioner Lindsay, who was assisted at the inquiry by Captain James McMaugh and Captain James Ewart, acting as assessors, in his finding emphasizes the fact that the stranding of the Acadian was caused by the poor judgment of the master, who was not justified in assuming that he was within three miles of Thunder Bay, without resorting to the means of verifying his position by a cast of the lead. The commissioner considered that it was not good seamanship, under the prevailing weather conditions, to attempt to make the proposed shelter without being assured of the ship's correct position.

The steamer Acadian was one of the vessels that survived the storm which raged on Lake Huron on November 9 last, when the Canadian steamers James Carruthers, Wexford, and Regina, were sunk, and their crews drowned. The Acadian was en route from Cleveland to Port Arthur with a cargo of general merchandise.

LAKES STEAMSHIP MONOPOLY THREATENED.

FOLLOWING the merger of Great Lakes steamship lines, it has been rumored for some time, and now circumstances affirm the rumor to a great extent, that a new line will be started between Montreal, Toronto and Western Great Lakes ports to compete with the amalgamation. Mr. James Playfair, who was general manager of the Richelieu & Ontario Co. before the affiliation, is said to be the head man of the company which is being organized.

It has been stated on reliable authority that Mr. Playfair has secured options on eleven American vessels, to be used on the new line, and this report is confirmed by the information that the Chicago & Duluth Transit Company has sold two 4,000-ton freight and passenger steamers, the Minnehaha and Minnetonka, to a new Canadian syndicate for use on the Montreal, Toronto and Great Lakes route. Mr. Playfair has recently spent several days in Chicago negotiating important business, and local transportation men have no doubt as to what the nature of it is.

Organize Another Line.

Mr. Playfair stated to his friends, when severing connections with the R. & O. that he intended to organize another line and that he was negotiating for the purchase of a number of boats. It is stated that the Northern Navigation Company of Collingwood, of which Mr. Playfair was formerly the head, but which is now combined with the other firms, formerly ran eight vessels on the Collingwood, Owen Sound, Soo and Mackinaw route, while only two vessels are being operated on it now. Three American lines have come in on the trade this route and are giving a service between Chicago, Mackinaw, Collingwood, the Canadian Soo, Two Harbors and Duluth. The American Line of Chicago put two ships, the North America and South America, on the route last year with prospects of increasing the number.

Mr. Playfair, it is believed, will put a service in commission on this route to compete with the American companies in handling the extensive tourist business of the summer months, from which the present operators are known to reap considerable profit.

The organizer of the new line has had a long and varied experience in the steamship trade on the Great Lakes. He was first connected with the Midland Navigation Co. Later he secured control of the R. O. & A. B. McKay Steamship Co. of Hamilton, the Northern Navigation Co., and the Inland Lines, all of which are now merged into the Canada Steamship Lines, Ltd., of Montreal.

CANAL BASIN DRYDOCK FOR MONTREAL.

AT the regular meeting of the Montreal Board of Trade, held a few days ago, the Harbor and Navigation Committee reported that, as instructed by the council, it has embodied its views with regard to the need for a larger drydock in the canal basin in the following letter to the Minister of Railways and Canals:

"We have the honor to bring to your attention the necessity, in the interests of inland shipping, for a larger drydock in the Canal Basin.

"It is true that inland vessels of any size can be accommodated in the Duke of Connaught floating drydock, but the charges for operating so large a dock are necessarily much higher than those for the smaller sized dock sufficient for all requirements of inland vessels, and any of the larger lake vessels needing to be docked must pay the high rate charged by the Duke of Connaught, or take the risk of going up the canals to one of the lake ports where repairs are made at a reasonable charge.

"The council, therefore, deems it of great importance that the present dock, known as Tate's Dock, be enlarged, or a new dock be constructed of sufficient capacity to accommodate any of the lake vessels requiring repair.

"The Montreal Dry Dock and Ship Repairing Co., the lessees of Tate's Dry Dock, have well equipped machine and boiler shops and a well-organized staff of men, but the dock is unfortunately antiquated, in bad depair, and can accommodate only the smaller craft.

"The council is informed that the present lessees of Tate's Dry Dock are

willing to pay interest on the capital expenditure necessary to build a drydock of the required size, provided the Government will carry out the work, and I am directed to urge this proposal for your consideration as being in the interests of the trade of the port of Montreal, and of the country generally. The council, however, recommends that in any lease or agreement with the company your department stipulate that the rates to be charged shall not exceed those in effect at the lake port drydocks.''

QUEBEC HARBOR EXPENDITURE.

AN expenditure of $2,273,559 during 1914 is recommended by the Harbor Commissioners of Quebec in their annual statement recently tabled in the House of Commons, by Hon. J. D. Hazen. The total is made up as follows: Dredging a trench for the proposed quay wall and the channel approach, $400,000; extension to the Louise embankment, together with necessary filling, $952,029; railway terminals for extending the delivery yard accommodation, trackage for the new grain elevator, railway tracks to serve the bulkhead shed in connection with the car ferry terminals, $50,000; purchase of Indian Cove property, required as service ground in connection with works under way, $108,964; for the purchase of four locomotives required by the commission for operating their railway lines, $50,000; to provide grain-loading galleries in the new grain elevator, $500,000 (these will be of fire proof construction, capable of delivering grain to ocean vessels at the rate of 40,000 bushels an hour); to provide ten dock scows for use in the various works, $75,000; for completing the retaining wall at Lampson's Cove for a length of 1,400 feet, $137,565.

ABOLISH QUEBEC PILOTAGE SOON

WHEN the Hon. J. D. Hazen, in a recent communication to the Montreal Board of Trade, said that the abolition of the Quebec Pilotage Corporation would be considered in connection with the revision of the Merchant Shipping Act, he probably might have gone further and thus have saved the members of that body some of the impatience which they are exhibiting.

There never has been any doubt that this—the vital recommendation of the investigating commission would be carried out, but the report came in at the very close of last session, when it was too late to bring in special legislation called for in connection with the Quebec Pilotage. The matter meanwhile has been duly considered, and there is the best of authority for the statement that the Merchant Shipping Act in its revised form contains a clause abolishing the Pilots' Corporation. There are matters of policy which it is not prudent to forecast, but there can be no doubt as to what the Government intends to do.

As was pointed out previously by the Hon. Mr. Hazen in his letter to the Montreal Board of Trade, the Minister takes the position that all the substantial recommendations of the commission which could be carried out by departmental regulations have been attended to, including the placing of the Quebec pilots under an independent superintendent responsible to the Department at Ottawa. It is true that he is not a captain of sea-going experience, but nevertheless, he is an experienced pilot on the St. Lawrence, and, in the opinion of the Minister, is competent to discharge the duties assigned him.

The Hon. Mr. Hazen has given notice of the resolutions which precede the revision of the Shipping Act, and by which, as stated, the Pilots' Corporation will be abolished.

MONTREAL HARBOR 1914 EXPENDITURES.

THE proposed expenditure on the harbor of Montreal during the coming year will be four and a half million dollars, according to the harbor improvement plans, submitted to the Minister of Marine, by W. G. Ross, president of the Harbor Commission of Montreal, and tabled in the House of Commons. It is stated that as the commission has not yet decided on the extent of its proposed railway operations, it has been decided that it will not be necessary to amend the Acts in that respect during the coming session. The statement presents in detail the expenditure of the $12,000,000 already granted by Parliament, and outlines the following as the programme for 1914:

Continuation of work on elevator No. 2, $808,678; harbor railway system, $282,674; railway equipment, $300,000; Victoria pier and market basin, $293,000; permanent wharf transit sheds, $477,990; warehouse, $200,000; shore wharves, sections 24 to 30, $164,789; amelioration of entrance to Lachine Canal, $50,000; property to be acquired for harbor purposes, Lachine Canal and vicinity, with improvements, $100,000; dredging and filling, $284,738; paving and wharf railways, $150,000; improvement to eastern section below St. Mary's current, floating dock site, $165,000; general improvements and plant, $200,000; permanent sheds, Tarte pier, and equipment, $28,474; Point aux Trembles industrial wharf, $130,000; wharves and facilities south of Lachine canal, $100,000; industrial wharves, $100,000; St. Lambert-Longueuil road and sewer, $100,000; over-flow dam and bridge for giving connection between Montreal's congested district and the South Shore and access to St. Helen's Island, $50,000; fire-proof office building, $100,000; retiring debentures, $200,000; real estate, $116,605; traffic plant, $192; Aylwin street subway, $50,000; unforeseen items, $47,660.

The unexpended balance from previous votes of Parliament amounted to $2,743,571, on January of this year. The proposed expenditure during 1914, 1915, 1916 and 1917, will total $15,000,000, and Hon. J. D. Hazen has given notice of the necessary resolution for providing for advances to this amount.

THE DAVIE SHIPBUILDING PLANT, LEVIS, QUE.

GEORGE D. DAVIE, writing to the Montreal Gazette a few days ago, with reference to a report published to the effect that the Canadian Vickers Company are negotiating for the purchase of the plant of George D. Davie & Sons, Levis, while admitting negotiations are going forward for the purchase of the plant, denies that Vickers are the parties concerned. He says that as there have been a number of reports in the public press with reference to the future of this shipbuilding plant, I would like to state once and for all that I have arranged to take over the interests of the other partners and continue the business under the name of ''The Davie Company, Limited,'' and am now incorporating a company for such purpose. Although some new capital is going in, the plant will continue to be operated and controlled by myself.

Great Lakes Ice Conditions.—Reports from regular and display stations of the Weather Bureau of the United States and Meteorological Office of Canada indicate that ice fields have practically disappeared over the extreme western portions of Lake Superior, but extend beyond the vision at Keweenaw Point. Some fields are reported off Marquette, also over the eastern portion, where they are moving with the winds. The ice in Whitefish Bay is solid. On St. Mary's River the ice ranges from eighteen to twenty-four inches, and is not snow-covered. In Green Bay ice remains solid. On Lake Huron extensive fields are reported from Presque Isle south to Thunder Bay Island over the central and extreme southern portions, and also along the eastern shore. St. Clair River is open to Recor's Point. The ice has been running freely from Lake St. Clair recently. Over the extreme western section of Lake Erie fields have broken up and are disappearing.

PACIFIC COAST DEVELOPMENTS

Featuring the Record of Progress and Dealing With the Steps Being Taken to Stimulate and Enlarge the Already Established Shipping and Shipbuilding Enterprises

DOMINION FISHERIES PROTECTION CRUISERS.

TAKING her second cruise to Northern British Columbia waters in the service of the Dominion Government, the Fisheries Protection Cruiser Malaspina, Captain Newcombe, left the Esquimalt naval yard on March 13. As on the occasion of her initial cruise: the Malaspina will go as far North as Prince Rupert, and will make that port her base of operations. The trim little cruiser has been taking aboard stores for an extended cruise to the North. The length of her absence is at present indefinite, but it is expected that she will be away from Esquimalt about six weeks. On her last voyage the Malaspina failed to sight anything that at all resembled a fish poacher, but a close watch will have to be kept on this occasion, as the season's fishing operations are under way.

The Galiano, sister ship to the Malaspina, is now at Esquimalt, being overhauled in drydock. She will leave on her first cruise in the fishery service early in April.

The Dominion Fisheries Patrol Steamer Newington is berthed at the naval wharf, Esquimalt, to undergo repairs made necessary as a result of her recent collision at Swanson Bay. She will be in commission again at the beginning of next month.

YARROWS, LTD., BUSY.

MR. KEAY, manager of Yarrows, Ltd., the British firm which recently took over the plant of the B.C. Marine Railway Co.. in a recent interview stated that his firm had a considerable amount of work on hand.

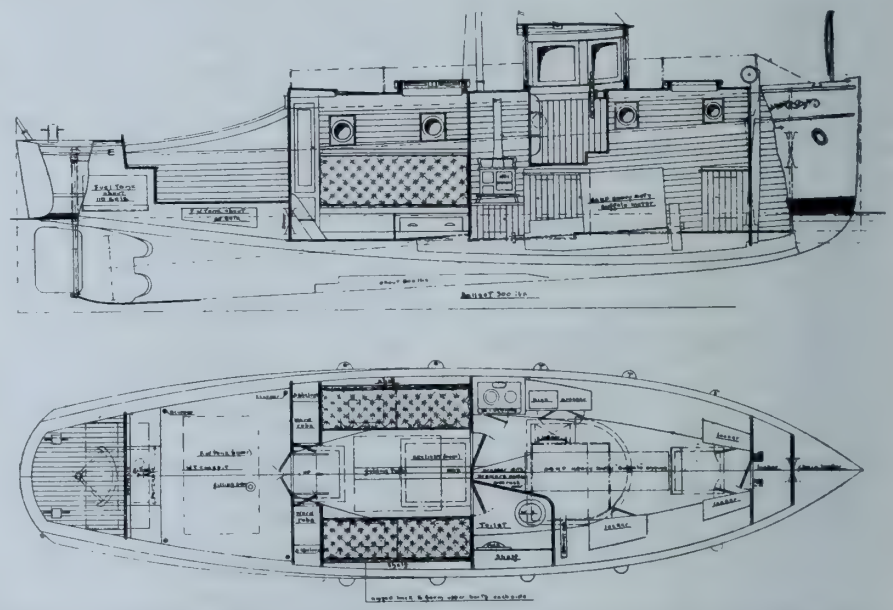
"At present the steamer Princess Mary is being lengthened, which is a large contract; the Dominion Government's hydrographical ship Lillooet and the steamer Estevan are being repaired and overhauled, while the cable ship Restorer will go into drydock in a few days for painting and a general cleaning. This," observed Mr. Keay, "is the programme we have before us. I may say that our employees appear to be satisfied with the conditions, and that this branch of Yarrow's Ltd., may be depended on to keep well abreast of the progress of the North Pacific."

Mr. Keay added that negotiations are under way for several contracts of importance, and confidence is felt that one or more, at least, will materialize. Every effort is being made to keep the plant constantly active with the idea of giving the men steady employment, this being the best way of maintaining a good force of artisans, and of establishing satisfactory relations between employees and employer.

HUNTING LAUNCH FOR PRINCE RUPERT, B.C.

A THIRTY-SIX-FOOT cabin launch has recently been designed by W. G. McBride, of Tynemouth, for W. J. Thomas, of Prince Rupert, B.C. As will be noted from the illustrations she is of the raised top-side type, a prominent feature being the very large control station a little forward of amidships. It need hardly be pointed out that the position and general design of the control station were part of the owner's requirements.

The launch is 36-ft. in length, 9 ft. beam, and of 3 ft. 8-in. draught. Headroom of 6 ft. is arranged in the cabin. She is strongly built of fir 1 in. thick, with oak frames 1½ in. by 1½ in., spaced 9 ins. apart on a fir keel of 5 in. siding with oak strip at the bottom.



GENERAL ARRANGEMENT OF 36 FT. HUNTING LAUNCH FOR PRINCE RUPERT, B.C.

Stem and stern posts are of gumwood 5 in. sided. The beams are of oak, the stringers of fir, and the deck planking of cedar, covered with canvas. Copper fastenings are used throughout.

Accommodation.

Turning to the accommodation, it will be noted that there are, practically speaking, only two main compartments, these are the combined forecastle and engine room, and the saloon. Each is of ample size, and, between the two, a lavatory and also a galley are arranged. The control house is situated almost directly over the engine, and naturally all engine controls are located within the reach of the helmsman. In the saloon there is sleeping accommodation for four persons, two settees with backs being arranged to fold up and form upper berths. Large lockers and drawers are fitted under the settees, and there are two large wardrobes and a folding table. Aft of the saloon is a 7-ft. self-draining cockpit, under the floor of which are located the water tanks, with capacity of 65 gallons.

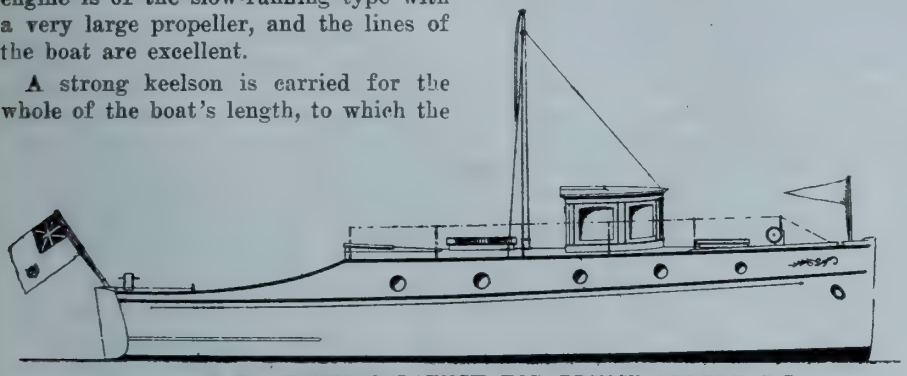
Machinery.

The machinery consists of a four-cylinder 24 h.p. to 30 h.p. heavy-duty Buffalo marine engine running on paraffin, and driving a bronze propeller of 2 ft. 9 ins. diameter. A fuel tank of about 110 gallons capacity is carried under the after deck. In order to give the required trim and suitable stability, an iron keel of about 800 lbs. weight is carried in the outside wood keel, while there is also a small quantity of inside ballast.

References to the plans will show that the control station may be entered either from the engine room or from the cabin. The plate glass windows may, of course, be lifted out in fine weather, the roof then forming a useful shade, while in rough weather, the helmsman is alto-

gether protected from spray and wind. Rails are fitted around the forward deck to give a certain amount of protection to anyone making a passage along the deck forward. The general design of the boat shows a craft which might be constructed economically, and prove very efficient for the power installed. A speed of 9¼ knots is expected, and we think the estimate is a modest one, since the engine is of the slow-running type with a very large propeller, and the lines of the boat are excellent.

A strong keelson is carried for the whole of the boat's length, to which the garboard strakes are fastened. The sections aft, therefore, are flatter than would be possible with a rabbet line carried low down on the keel. This serves a double purpose, for not only is a clean, flat run procured, but the amount of work in planking up is materially lessened. Until recently it was thought that flat-floored sections almost invariably detracted from a boat's sea-going qualities. Certainly a vessel with a flat fore-body and of light draught may "pound" when pitching in a head sea, but pounding never takes place at the stern. The boat in question has club-footed sections forward which tend to minimize pitching, besides giving fairly straight water lines and obviating undue hollow in the fore-body.—Motor Ship.



36 FT. HUNTING LAUNCH FOR PRINCE RUPERT, B.C.

C. P. R. PACIFIC COAST SERVICE.

PRINCESS MARGARET and Princess Melita are the names that will grace the bows of the new coast passenger steamers under construction for the C. P. R. at the Dumbarton yards of Messrs. William Denny Bros., the famous Clyde shipbuilders.

In view of the many Princesses now afloat, it was not without considerable thought that the important selection was made. It was announced at the offices of the British Columbia Coast service, that the selection of the names had been made and approved by Sir Thomas Shaughnessy. The steamer Princess Margaret is named after the eldest daughter of the Duke of Connaught, Governor-General of Canada, while the steamer Princess Melita takes her name from the daughter of the late Duke of Edinburgh.

Probable Date of Launching.

Although the date has not been set for the launching of these magnificent 5,000-ton craft, C. P. R. steamship officials are inclined to believe that they will be floated in June or July. The work of construction is being rapidly pushed forward. Under the terms of contract, Messrs. Denny Bros., will deliver the two ships on this coast by the end of the year, in good time for the rush of business that will follow the opening of the Panama-Pacific Exposition. The two vessels are to be operated in the triangular service between Victoria, Vancouver and Seattle. All the dredging and rock-drilling plant, operated by the Dominion Government at Victoria, are now concentrating efforts in dredging the Inner Harbor to a sufficient depth to accommodate the big craft.

SHIPBUILDING AT COQUITLAM, B.C.

IN our February issue reference was made to the launching on January 31, of a four-masted schooner by the Coquitlam Shipbuilding and Marine Railway Co., Coquitlam, B.C. We are now in a position to give some particulars and a photograph of the vessel, and believe this recent development will be found of large interest to our readers.

The keel of the "Coquitlam City," as the vessel has been named, was laid in April of last year, and with its exception and that of the spars, all of the lumber used in construction was obtained in Coquitlam. She is built of Douglas fir. It is intended to install auxiliary propelling machinery in the near future, and with this end in view, the shaft tunnel and engine bed already form part of the ship's structure.

Vessel Particulars.

Length over all	216 ft.
Beam	41 ft.
Depth of Hold	14 ft.
Mean Draft	16 ft.
Registered Tonnage	921.68
Gross Tonnage	933.07
Lumber Capacity	1,000,000 ft.

The ship is iron-kneed and copper-fastened throughout, and all the iron is galvanized, this operation being performed in a plant installed in the shipyard for the purpose. She will engage in the lumber trade, and is the first vessel of this type to be built on the B.C. coast, as well as being the largest engaged in foreign trade.

The managing director of the Shipbuilding Co., Mr. L. D. Shafner, is a Nova Scotian, having been engaged in shipbuilding in that Province before coming to Coquitlam. He is very optimistic as to the future of the industry on the Pacific Coast and his company proposes to build a number of vessels of similar type in preparation for the foreign trade that is likely to result from the opening of the Panama Canal.

The "Coquitlam City" has been chartered by Messrs. J. J. Moore & Co., San Francisco, to load lumber at Willapa Harbor, Wash., for discharge at Brisbane, Australia. She has been classed under Bureau Veritas and has a twelve-year rating.

The builders propose to install marine ways to handle the repair business of the Fraser River, and further inform us that the plant of the company where the Coquitlam City was constructed is at the confluence of the Pitt and Fraser Rivers.

SAILING SHIP "COQUITLAM CITY."

VANCOUVER MERCHANTS' EXCHANGE.

VANCOUVER now has a Merchants' Exchange, similar to that in existence in Seattle and other Pacific Coast cities. This new organization was formed recently at a meeting of representative shipping and mercantile men, held in the Board of Trade Chambers.

The object of the exchange will be to serve as a news bureau, where merchants, shipping men and others interested or affected through shipping may daily obtain information. Latest quotations, Lloyd's information, vessel movements and wireless reports will be

kept posted up. A temporary committee was appointed to complete the details of organization and secure suitable quarters for a central office. The initial membership fee was fixed at $25, and the dues at $5 quarterly.

Firms Enrolled.

The following firms have already been enrolled as members:—Frank Waterhouse & Co., Union Steamship Co., Empire Stevedoring Co., Victoria and Vancouver Stevedoring Co., Gardiner Johnson Co., Guide Publishing Co., George C. Salt Lumber Co., Boyd-Phillips Co., Lincoln Steamship Co., B. C. Marine, Ltd., Vancouver Insurance and Vessel Agency, Canadian Tugboat Co., Ltd., F. R. Stewart & Co., British Columbia Sugar Refinery, Pacific Coast Steamship Co., Kelly, Douglas Co., Union Steamship Co., of New Zealand (Canadian-Australian Line), Allison, Higgins & Ford Co.

The following committee, was in the meantime, appointed to work out plans along which the exchange will be conducted and formulate same:—Capt. Fullerton, E. H. Beazley, A. E. Black, B. B. Phillips, W. A. Lawson, P. Baith, W. R. Dockerill, W. H. Walton, J. H. Hamilton, and G. G. Bushby.

Addresses pointing out the advantages to be gained by such a body were made by Mr. E. H. Beazley, manager for the Union Steamship Co., and J. H. Hamilton, editor of Industrial Progress, who has had much experience in connection with the Royal Exchange, London, and the exchanges in Hamburg and Marseilles. It was stated by Mr. Dockerill that later it was hoped that New Westminster would join with Vancouver. Mr. Wilson Blue, former assistant secretary of the Seattle Merchants' Exchange, gave an outline of the workings of that body. Captain Fullerton, of the Board of Harbor Commissioners, also expressed himself as being strongly in favor of the movement.

Too Many for the Boss.—One of the bosses at the Baldwin Locomotive Works had to lay off an argumentative Irishman named Pat, so he saved discussion by putting the discharge in writing. The next day Pat was missing, but a week later the boss was passing through the shop and he saw him again at his lathe. Going up to the Irishman, he demanded fiercely:

"Didn't you get my letter?"

"Yis, sur, Oi did," said Pat.

"Did you read it?"

"Sure sur, Oi read it inside and Oi read it outside, and on the inside yez said I was fired, and on the outside yes said, 'Return to Baldwin Locomotive Works in five days.'"—Lippincott's.

A1 AT LLOYD'S.

THE deep tones of an old bell sounding through the hum of talk in a great business hall—this typifies London's paradox of ancient surroundings and modern trade to the visitor to Lloyd's in the Royal Exchange. If he does not know the history of the place and is curious enough to ask the meaning of the sound, he will be given an explanation to the effect that the bell is tolled because a ship has been lost.

Lloyd's is a world centre of marine insurance. As far back as three centuries ago, the business of assuming risks for cargoes sent by sea began to concentrate there, and it has developed into one of the greatest of insurance houses. Early in its history the old bell was hung in the underwriters' room, and the custom of tolling it whenever a ship was lost was begun. Ever since that time, through various changes of location, the bell has been kept as a part of the furnishings. Despite the swift service of electricity, which brings the news of loss immediately to each broker, the old habit is still observed, and the past is recalled by the solemn notes of the bell whenever there is a disaster at sea.

A Gigantic Business.

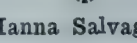
Few in England's Metropolis realize the gigantic business represented in the name of Lloyd's, and fewer still have seen the throng and the serious ceaseless activity of the great human beehive. Yet, from the physical giant who in scarlet gown receives you at the gate and in stentorian voice calls the name of the member you seek, to the dignified personage in the "room," enthroned on an elevated platform, who acts as the crier, Lloyd's is one of the most interesting assemblies in the world. Many of the furnishings date back to the "good old days," when there were neither steam nor armored ships, and no cable or wireless messages announced the departure or arrival of the vessels intrusted to the dangers of an inscrutable sea.

Were Edward Lloyd, the old coffee tavern keeper of Tower street, to return to his haunts in the city of 1600 what astonishment would be his! It was he whose name has been immortalized in the commercial history of the world. His coffee shop was the meeting place of men interested in commerce by sea, and over steaming cups were discussed the dangers to men and craft exposed to the power of the mighty monster. Already they were known by the name of "underwriters." They agreed to divide the risk attending the shipping of goods among themselves, according to the distances to be covered, the seafaring quality of the "windjammer," the capacity of captain and crew, and, above all, their financial resources in meeting a loss. In 1692, Lloyd's coffee tavern removed to Lombard street, and little by little an incorporation took place, the name of "Lloyd's" was assumed, and the house started on it career. In 1774 Lloyd's was obliged to seek still larger accommodation, and succeeded in getting possession of the upper part of the Royal Exchange, from which place it is still carrying on its gigantic work.

A Beneficent Institution.

The real importance of the institution dates back from 1775 to 1815. During the incessant wars which devasted the fairest portions of the continent, England, by reason of her geographical position, was the only country guaranteeing security against the depredations of Bonaparte. The risks then assumed by the underwriters were large and hazardous, and resulted in heavy losses. Rumors of tremendous obligations raised doubt in the public mind as to the ability of Lloyd's to meet the liabilities, and Parliament was obliged to appoint the customary Royal Commission. The findings resulted in a glorious victory, and ever since Lloyd's has retained its world-commanding position.

The institution headed all movements aiming to diminish the dangers of sea and land. It exposed and punished with draconic severity frauds in sending unseaworthy ships with worthless cargoes across the ocean. Its greatest achievement consisted in organizing and perfecting a system whereby news from every quarter of the globe, could be gathered with the utmost rapidity. By this system, the movement of almost every ship, no matter where and when she was plying, and under what flag, could be traced. Needless to say, every conceivable description of craft is chronicled in Lloyd's register, and the ship receiving the hall-mark "A. 1, Lloyd's" is regarded as having the highest recommendation.—N.Y.E.P.



Steamer Hanna Salvage.—As soon as the ice breaks up, the wrecking steamers of the Reid Company will leave for Port Austin, to start wrecking operations on the steamer Hanna, of the Hanna Line, which was thrown up high and dry in the storm of November. The Reids have purchased her cargo of coal, and they will lighter this and bring it down as soon as possible after the opening of navigation. After the coal is removed, the wreckers will make repairs to the bottom of the steamer, and will then pump the water out and raise her.

St. Catharines, Ont.—Captain William McIlwain, for fifty years a resident of St. Catharines, died on March 2, aged 87 years.

READERS' NOTES AND VIEWPOINT

Devoted to Brief Article Contributions Covering Experiences, Correspondence and Comment on Matters Marine. We Pay for Suitable Material.

REPLACING GAUGE GLASSES.

By R. BELL.

IN a recent issue of Marine Engineering of Canada, one of your correspondents mentions a difficulty he has with gauge glasses bursting after being replaced following cleaning. In the first place, I might ask if it is not rather an unusual practice to remove glasses for cleaning? Blowing a glass through regularly generally keeps it clean. With regard to the glasses breaking, I think this might be explained as follows:

It would be impossible to put in a glass and screw up the packing nuts without setting up strains in the glass in certain directions. A new glass is flexible to a certain extent and allows for these strains. Now, is it not possible that after a period of service, a glass becomes less flexible, and on being replaced after cleaning we may set up a strain in it in a different direction than previously; under these conditions the glass will therefore be very liable to fracture. I have noticed on several occasions that glasses often burst after any interference with the mountings.

KINK FOR PUTTING ON OVERALLS

By James E. Cooley.

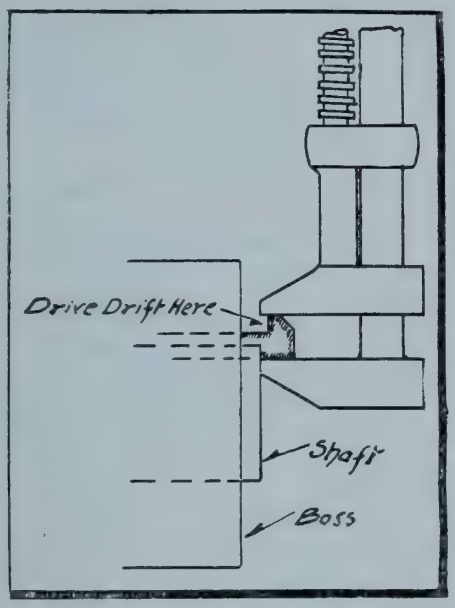
EVERY engineer knows that each time when putting on a pair of overalls the legs of the trousers become drawn up and have to be pulled down and smoothed out, as they feel uncomfortable when humped-up. A useful kink to prevent this, and shown in the illustration, is to fold the trouser-leg about the ankle and fasten with a bicycle-clip. The overalls will then slip on easy. The clip should be left on, as it prevents dust and dirt from getting up inside the trouser-leg.

KINK FOR PUTTING ON OVERALLS.

HOW TO PULL A TIGHT KEY.

By C. H. Lloyd.

I NOTICED in the February issue of your journal a kink sent in by N. G. Near, showing a method of pulling a tight key. This reminded me of a similar method which I have often used with success. Place a common monkey wrench on the head of the key, as shown in the sketch. Between the head of the key and the wrench drive a drift made of an old file tang or some other piece of steel, and steady the wrench with the hand, so that the key will not bend. The wrench holds the drift in place and prevents it flying out. It will be seen that the drift must not be thicker than the height of the head on the key. With this device it is possible to draw very stubborn keys without damage.



REMOVING A TIGHT KEY.

Lady Frederick Williams Taylor will break the bottle over the bows of the new boat of the Canada Steamship Lines, to be launched at Port Arthur, Ont., on April 4. The party going up for the ceremony will include Sir Montagu and Lady Allan.

PUT BACK THE PLIMSOLL LINE.

I WISH to congratulate the Board of Trade, says the special commissioner of the Sunday Chronicle. It has had the courage to confess that it may have made a mistake. Hundreds of lives and scores of ships have been sacrificed to demonstrate the possibility, but now the Board has come to the conclusion that there is a case for inquiry, and perhaps, therefore, for reform, there will be, sooner or later, an end to the preventable tragedy of the sea which has struck indignation into the rank and file of the mercantile marine service.

I refer, of course, to the tragedy of the altered load line. Perhaps you have not heard much about it. The skippers and their mates and crews have suffered apparently in silence ever since in 1906 the Plimsoll line was raised out of all recognition, or, in the metaphor of the mariner, thrown overboard as a sop to the sharks of competition. There have been no public mass meetings of skippers and mates, no strikes—nothing at all to indicate to the public that all was not bright and calm upon the sea.

Nevertheless there has been a storm brewing these last seven years, and the appointment by the Board of Trade of a Select Committee on the load line question has come just in time to prevent the storm from breaking. It has not done more than delayed it if the committee decides in its unwisdom that there is no need to put the line back to the Plimsoll mark.

Relying on Theorists.

The fear that such may be the committee's finding arises from the composition of the Select Committee. Only one member of it has practical knowledge of navigation, and even he has no knowledge of the working of ships under the Lloyd George load line. I call it the Lloyd George line, by the way, because it is so known among seamen, although Mr. George was responsible for it only nominally. He acted in 1906, when President of the Board of Trade, on the advice of a committee appointed by Mr. Balfour's administration in 1905. If he is to be blamed at all, it is for paying more attention to his expert theorists, who make experiments with model ships in tanks of water, than to the practical seamen who have to handle, and float or sink with real ships in real storms. That was the mistake which led to the alteration of the line, and that is the mistake which may lead to the new committee

recommending that there is no need for revision.

However, let me make clear to you land lubbers what has happened and why it has happened. The line for which Plimsoll fought and defied Parliament was drawn to prevent the overloading of ships. It existed from the early eighties up to 1906. Then, in response to the agitation of shipowners, it was raised so that ships were allowed to be more heavily loaded and more deeply immersed in the water.

Why the Line Was Altered.

The case for the shipowners was that German and Scandinavian vessels, owing to their higher load lines, were at an advantage over the British shipping. So a Select Committee sat and reported in favor, not of attempting to induce the foreign Governments to come up to our safe standard, but of our ships going down to the foreign line of peril. Lord Muskerry, himself a practical seaman, protested in the House of Lords, and asked, "Are our seamen to be considered the legitimate prey of competition, and are their lives to be exposed to unnecessary risks for the sake of making profits?"

He was assured, of course, that he had an attack of bogeyitis, that the experts agreed there was no danger, and so on and so forth. So the new line was adopted. It was applied not only to new ships, but to vessels twenty,thirty and forty years old. It was done on scientific principles, of course. The Board of Trade surveyors did not just go round with a paint pot and put the mark so much higher. Oh, dear, no! Nice calculations were made, but they were made without estimating the power of nasty seas.

In many ships the reserve of buoyancy was destroyed. While such a vessel was all right with the full load in calm water there was no margin of buoyancy on which to play when she became further burdened with seas breaking over her in rough weather. All boats except the very large liners ship water during heavy gales. The Plimsoll line allowed for this, and, well handled, a ship would ride the sea even after taking great quantities of water through the hatchways. Not so with the new line.

The Sailor's Humor.

A skipper, who has been to the Antipodes many a time, told me of his first experience with the new mark. He was at Melbourne when the new line was adopted, and he received a cable from his owners to raise the line three inches and load up to that mark. He did so. A few days out from Melbourne he got into heavy weather, and found that his ship had completely changed. Hitherto she had been responsive, seaworthy, buoyant. Now her decks were awash; she did not answer to the wheel, she could not make headway. The first officer was swept overboard and lost. That death, declared the skipper, was due to the new load line.

The Board of Trade, however, has consistently refused to recognize that such deaths, of which there have been scores, can be attributed to the change. The Board will not admit that if you lower a ship's deck almost flush with the waves and render her so stupid with water that she cannot be managed, the accidents directly due to waves sweeping the decks are indirectly due to the diminution of the freeboard; that is, the space between the decks and water line. Yet it seems fairly obvious, doesn't it?

The average sailor, be he master, mate, or foremast hand, is not easily scared. He sees grim humor where you or I would see merely the pending tragedy. Such a gift of grace enables the skipper of one vessel to report that "the seven extra inches of immersion, represented by an extra 170 tons of cargo, has induced us to rechristen our ship. We call her the Submarine A1 now."

Poor Chances in a Stiff Gale.

"Last winter" (I quote the words of an experienced sea captain) "was one of the most disastrous to shipping that can be recollected, and in the first four months twenty steamers were reported missing, thirteen had foundered, or had been abandoned, and there was a serious loss of life. Every sailor knows the chief cause of this is the alteration of the deep load line, and also that the average steamer loaded down to her marks with a dead-weight cargo (i.e., a cargo such as iron or coal that has no spring in it) has a poor chance of surviving a really bad gale."

Mr. Lewis, the Cardiff Stipendiary, after an exhaustive inquiry into the loss of the North Briton and some twenty lives, attributed it to the new load line, and I think it is safe to assume, if the law is satisfied in one instance that the loss was due to this change, the evidence of all sailors can be accepted when they declare that sea tragedy has followed in its wake.

Mr. Lloyd George, when recently defending the alteration, declared that, so far from the change having proved disastrous, there had actually been fewer losses since the alteration than in the preceding similar period. That is trying to prove too much, and Mr. George, in his comparative statistics, included among the wrecks from 1900 to 1906 those of vessels of from two to seven tons. He omitted, however, vessels of similar tonnage from the second list. It is as though you "compared" the mortality rates of a town in one year with the next and included the deaths of children in one year and left them out in the other.

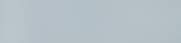
There can be no doubt in face of the overwhelming testimony of men used to the handling of ships that there is a case for inquiry and revision. Mr. Buxton, the President of the Board of Trade, has announced that an International Conference on the load-line has already been arranged. That is well, if it mean that the British line is to be lowered to the Plimsoll mark and the foreign shipping is to start from the same level.

Hope for the Future.

The alternative to that is for the British mark to be lowered again, at least so far as concerns old vessels. Unless that be done there will be trouble. The sailors, whose work has been made heavier, more difficult, and more dangerous by the extra cargoes that turn seaworthy ships into unseaworthy ships, are, I know, growing restless; and the skippers and officers, whose lives are imperiled, have been calmed only by the hope that their seven years' war is nearly over and nearly won.

They have gone on risking their lives in silence because the alternative was to lose their livelihood. They will not continue to play the part of what Lord Muskerry might call martyrs on the altar of profit. Just at present, however, they are hopeful. They point to the fact that the Board of Trade has become very insistent that ships' masters shall have perfect sight, and they assume, being innocent souls, that the Board will consider masters with perfect sight to be better judges of the seaworthiness of the ships they command than the experts who merely sail ships in their brains.

The point which must not be overlooked is this: That whatever may be sound in theory is not necessarily sound in practice. The Titanic was unsinkable until she sank. The perils of the sea will always be enormous. Is there any reason why the normal difficulties of navigation should be increased by giving to sailors the charge of ships in which they have no confidence?



Echo of Titanic Disaster.—A somewhat sombre echo of the Titanic disaster was heard at Osgoode Hall, Toronto, on March 24, by Sir John Boyd, the Chancellor. when the case of the National Casket Co. came up for hearing, the latter suing the Canadian Express Co. for $5,000 damages for loss of business, alleging that the said company were responsible for a day's delay in the shipment of two car loads of coffins shipped from Toronto to Halifax at the time of the disaster. The Chancellor made an order requiring plaintiffs to produce the order for the coffins.

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Vol. IV MARCH, 1914 No. 3

PRINCIPAL CONTENTS.

OUR CIRCULATION DEPARTMENT.

ATTENTION is drawn to the fact that the circulation department of this journal is in charge of Mr. J. I. Coddington, Ph.B., to whom all correspondence relating to non-receipt of any issue by subscribers, advertisers, etc., should be promptly sent.

EDITORIAL COMPLAINTS AND CRITICISMS.

OCCASIONALLY we are recipients of a complaint or criticism relative to editorial matter published, but for the most part these reach us in a more or less roundabout, indirect, and therefore, unsatisfactory manner; to wit, they rarely come direct. Let us say at once that we are not only at your service in the most direct manner possible to receive complaint and criticism, but lay claim as well to an average mortal's courtesy. Further, it is a common, every-day experience outside of the editorial feature of technical journalism, to find that an indirect approach contributes either to a distortion of facts or to an increase of fiction, or both; a set of circumstances not originally intended.

"HE DID HIS DUTY."

THE EARL OF DESART, who presided at the Court of Inquiry, instituted by the British Board of Trade, relative to the burning and subsequent abandonment of the steamship Volturno in mid-Atlantic last October, when delivering the judgment following the evidence given, concluded a eulogy of the ship's officers and crew with the highly expressive remark: "Of Captain Inch, it is sufficient to say that he did his duty." No greater tribute or honor conferred can equal this notification to the world of ability, capacity, courage, and devotion displayed by a man under the most trying circumstances that a human being can almost be placed in, and no little pride may be appropriated by seafaring men at this latest addition to the record of their calling, a record, by the way, unapproached, either in peace or war, by any other sphere of life's activities.

That the pulse of appreciation of heroism beats as strong as ever—or shall we say stronger than ever—there is little room for doubt. Captain Francis Inch has been appreciated and honored for his manhood, and, what is more important, his example will be an incentive to his brother seamen, no matter what the circumstances.

THE COMING SEASON'S ACTIVITIES.

WITH the approaching relaxation of the Frost King's grip on our lakes and rivers, shipbuilders, shipping companies and marine men generally are now actively engaged in the various pursuits of refitting, outfitting, overhauling and bringing to life the sleeping vessels moored in our docks and harbors; and who that has experienced the enchanting thrill and satisfaction of mind that "a life afloat" brings shall say that those now engaged in the foregoing operations are not whole-hearted, deeply interested and full of cheery optimism in their work. The desire to have the stillness of the boiler and engine rooms broken by the roar of the furnace and throb of the piston stroke, to see the shiny piston rod like lightning flash glide up and down the cylinder and hear the gong of the telegraph announce "stand by," "easy ahead," "full speed ahead," for another new season, constitutes pent-up cravings wholly foreign to landsmen whether the latter be of country mould or city fashion. Again, and they too are as completely under the spell as the men below, there are the navigating officers and deck crew, who in these days of preparation can be observed looking longingly and impatiently for that quiver and tremor of the "ship under way," so dear to the heart of the sailor.

To the men above-and-below-ship; to those whose duties belong to our harbors, docks, offices and navigation aids; and to those whose interests are proprietary, Marine Engineering of Canada extends hearty good wishes for the most satisfying and prosperous season ever, and the cherished hope that the minimum of disaster and tragedy be their portion.

BUILT AT A COST OF SOME $335,000,000. THE PANAMA CANAL—A BIRD'S-EYE VIEW.

It is impossible to say at the moment when that great engineering work, the Panama Canal, will be opened for general traffic; for recent indications show that the Culebra Cut continues to be a difficulty. In length, the Panama Canal is some fifty miles from deep water in the Atlantic to deep water in the Pacific. The cost estimated for the completion of the Canal is $335,000,000, a total which includes $20,000,000 for sanitation and $7,500,000 for civil administration, but does not include the $41,250,000 paid to the New French Canal Co. and the $10,000,000 paid to the Republic of Panama for property and franchises. The Gatun spillway, which is a crescent-shaped concrete dam, 808 feet long, holds back the water of Gatun Lake during the dry season and regulates the overflow during the rainy season. The Gatun Lake, formed by impounding the water of the Chagres River, has an area of 164 square miles, and the Canal channel through it is 500 to 1,000 feet wide, and from 39 to 47 feet deep, according to the season of the year.

—Cut. Courtesy Illustrated London News.

MARINE NEWS FROM EVERY SOURCE

Sarnia, Ont. — A large number of steamers are being fitted out here and at Port Huron for the coming season.

New Allan Liner "Calgarian."—The new Allan Liner "Calgarian" successfully underwent a speed trial on the Clyde on March 16.

Toronto, Ont.—It is rumored that James Playfair is organizing a company to compete with the Canadian Steamship Lines, on the Great Lakes.

The Canadian Stewart Co., Ltd., Toronto, have ordered a derrick scow from the Polson Ironworks. The vessel will be 120 ft. long, beam 42 ft., and 9 ft. deep.

Quebec, Que. — The Galway-Quebec Steamship Service Scheme is tied up for the present, as the provisional directors decline to subscribe more capital until more outside support is assured.

Goderich, Ont.—Under Government supervision the lighthouse here is being partially demolished to accommodate a revolving flashlight which the Dominion Government has decided to place there.

St. Catharines, Ont.—St. Catharines Board of Trade have passed a resolution asking the Dominion Government to deepen the whole St. Lawrence route so that ocean-going vessels can come right to Central Ontario.

Kincardine, Ont.—A big delegation from the town council and Board of Trade left for Ottawa recently to urge the Government to make a real harbor of refuge here and prevent any more big wrecks.

Vancouver, B.C.—Grant Smith & Co., and McDonnell, Ltd., two Vancouver firms which tendered jointly for the construction of the new Victoria wharves and docks, have been awarded the contract at $2,244,795.

Chatham, Ont.—The breakwater along the McGregor Creek side of Tecumseh Park will be extended this year, according to statements made by members of a delegation which waited on Col. Sam Hughes two weeks ago.

West Vancouver, B.C.—Naylor Bros. have offered to build the new wharf at Dundarave for $40,000. The wharf would be a permanent concrete structure and would be financed with the proceeds of the $40,000 by-law which the ratepayers approved for that purpose.

Montreal, Que.—A delegation of five hundred local business men, headed by Mayor Lavellee, visited Ottawa along with representatives from all parts of Ontario and parts of Quebec to urge the Dominion Government to immediately construct the Georgian Bay Canal.

Ottawa, Ont.—The cabinet has awarded a contract for dredging near the marine railway at Charlottetown, P. E. I., to V. D. Bartram for $36,000. The Thunder Bay Contracting Co. was given a contract for harbor improvements on Mocassin River, near Fort William, Ont., for $365,000.

Halifax, N.S.—Plans to build a large drydock are being prepared in this city by the Public Works Department, and surveyors have been sent to determine the exact location of the big dock. As soon as the site is selected, work will at once be commenced and the construction rushed with all possible speed.

Sarnia, Ont.—The Reid Wrecking Company has purchased the wrecked steamer Matoa from the Pittsburgh Steamship Co. The steamer Nicholas was also purchased by the Reids for $6,000. They received in addition $35,000 for salvaging the boat off the rocks of Thunder Bay, near Alpena.

Sault Ste. Marie, Ont.—It is understood that John O'Boyle & Co., of this city, have completed negotiations for the purchase of a large dredging outfit to be used in these waters. The plant comprises dredges, drill scows, dump scows and tugs, all of which is to be delivered at the Soo on the opening of navigation.

Out of Business.—The Government icebreaker Montcalm, while butting the ice at Port Neuf, a short distance above Cape Rouge, on March 13, damaged her rudder to such an extent that she will have to go into drydock for repairs. She is now out of commission so far as breaking ice is concerned for the balance of the season.

Ottawa, Ont.—The Government intends to build terminal elevators on the Hudson Bay and on the Pacific Coast, and interior elevators at Moose Jaw, Saskatoon, and Calgary. The Grain Commission will be given control of the grain movements through to salt water, instead of only to Fort William as at present.

Toronto, Ont. — On March 17, the third of six scows for the Quebec Harbor Commission was launched at the Polson Shipbuilding Yards. The scow is 144 feet long, with a breadth of 31 feet, and moulded depth, 11 feet 6 ins. The capacity is 500 cubic yards in seven pockets. The contents will be dumped by machinery.

Ottawa, Ont.—The Order-in-Council appointing a Commission to enquire into the economic feasibility of the Georgian Bay Canal was passed on March 17, at a sitting of the Cabinet Council. The personnel is as previously indicated. Ex-Mayor W. Sanford Evans, of Winnipeg, is chairman, and the members are Lieut.-Col. Frank S. Meighen and Edw. Gohier, of Montreal.

Vancouver, B.C.—Davis & Leslie, consulting engineers, 119 Pender Street West, have been appointed harbor engineers to lay out the North Arm of the Fraser River by the North Fraser Harbor Commissioners. The engineers will begin their work just as soon as the funds voted by the municipalities concerned are available.

Montreal, Que.—The Canada Steamship Lines have tendered for a first-class mail service which the Federal Government are about to establish on the north shore of the Lower St. Lawrence, extending from the city of Quebec as far down as Seven Islands, where a large pulp and paper plant has been established for some time past.

Ottawa, Ont.—It is announced that the Dominion Lighthouse Board has decided upon the placing of twelve lights and fifteen additional buoys between the Hudson's Bay Straits and Port Nelson as aids to navigation. The steamer Minto will go north as soon as possible to place the buoys. A wireless station will also be erected along the Straits.

Ottawa, Ont.—A breakwater is to be built at Leamington within the next couple of years. An appropriation for it will appear either in the supplementary estimates this year or in the main estimates next year. This was what Hon. Robert Rogers told a strong delegation from the North Riding of Essex which waited on the Minister of Public Works recently.

Lobbied for Shipbuilder.—That he contracted with former Rear-Admiral Bowles, president of the Fore River Shipbuilding Co., for $1,000 and a contingent fee of $4,000 to work for toll exemptions for American coastwise ships in the Panama Canal Act was charged on March 12 by Clarence W. De Knight before the Senate Lobby Committee. He was not paid the latter sum.

Port Arthur, Ont.—What is claimed to be the largest grain-carrying steamship in the world, to be named the W. Grant Morden, will be launched at Port Arthur on April 4 for the Canada Steamship Lines. The capacity of the new boat will be approximately 500,000 bushels of wheat. The equipment will be of the very latest, and the boat will carry Lloyd's highest classification.

Vancouver, B.C.—The contract has been let for the pile-driving and decking of the new shipping docks of McNeill, Welsh & Wilson, Ltd., on the False Creek site recently secured by this company. The architects, J. P. Matheson & Son, North-West Trust Building, announce that the work will be started immediately and rushed ahead. As soon as the wharves proper are completed the sheds and warehouses will be built.

The Polson Ironworks will build two 24-in. suction dredges for the Canadian Stewart Co. for work on the Toronto Harbor improvements. The dredges will be 170 ft. long, 42 ft. beam, and 12 ft. deep. They will be each equipped with four 400 h.p. Babcock & Wilcox semi-marine type boilers, and 1,500 h.p. triple expansion engines, driving a centrifugal pump. The engines will be supplied by the New York Shipbuilding Co., Camden, N.J.

Victoria, B.C. — Diving apparatus is being assembled at the plant of the Sir John Jackson Co., at Ogden Point in readiness for a start to be made on the granite base of the breakwater. On the first section of the breakwater the rip-rap has been brought to within a comparatively short distance of low water mark and this month the actual work of laying the big granite blocks is expected to be under way.

Ottawa, Ont.—Hon. J. D. Hazen says that the Lighthouse Board has decided to place twelve lights and fifteen additional buoys between the Hudson's Bay Straits and Port Nelson as aids to navigation. The steamer Minto will go north as soon as possible to place the buoys. The Minister also stated that an amount in the naval service estimates would be devoted to the erection of a wireless station along the straits.

Sarnia, Ont.—Marine men express the opinion that navigation will open late in April. Many of the officers and engineers of several of the big steamship lines will not start the work of fitting out until April 1. General indications are that ore shipments will be light in the spring and grain will be heavy. Ice conditions all point to a late opening of navigation unless an unexpected warm spell sets in within the next week or two.

Record Day's Run.—The world's record for a day's run by an eastbound Atlantic steamship has been broken by the Cunard liner, Lusitania. A wireless from Captain David Dowe, of the Lusitania, on March 14, brought word that between Thursday noon and Friday noon, March 12 and 13, his vessel had covered 618 knots, an average speed of 26.7 knots an hour. This beats the previous record of 614 knots held by the Mauretania.

Kingston, Ont.—At the meeting of the Board of Works on March 10, a deputation from the Kingston Shipbuilding Company waited on the committee and urged that steps be taken to have a track extended from the Grand Trunk inner station to their plant. Mr. J. F. Sowards stated that the company had an opportunity to secure two contracts which would total $1,000,000, and which would mean work for 300 men for two years. In order to secure this work the company must have railway facilities.

Transatlantic Record.—The Transatlantic record is now held by the Mauretania, which recently crossed westwards in four days ten hours, making an average of 26.01 knots. The sister ship Lusitania has made some very fast steaming since the last overhaul, making 27 knots average for eight consecutive hours and nearly 28 knots for one hour. It is confidently expected that during the present year the Lusitania will lower the record —probably at the first passage with continuous favorable weather prevailing throughout.

Kincardine, Ont. — Messrs. Craig & Carlisle, Government engineers, arrived here on March 10, to stake out the location of the new breakwater off the harbor, work upon which will proceed as soon as weather conditions allow. Robert Bermingham, of Chatham, secured the contract for this work, his tender being in the neighborhood of $131,000. This covers a breakwater 600 feet in length, commencing about 1,000 feet distant from the north pier and running in a northeasterly direction to a point north of the power house.

C. G. Lightship Launch.—Bow & McLachlan, Paisley, Scotland, launched No. 19, single-screw steam lightship, recently for the Canadian Government. She is of exceptionally strong construction to fit her for the work she is to be engaged in, and besides the lantern and lantern tower, which are special features of the steamer, she is fitted with wireless telegraphy and a complete electric light installation. The engines and boilers are being supplied by the builders, and these, with the hull, were built under Lloyd's survey as well as Canadian Government inspection.

Imperator has New Commander.—The Imperator, which left Cuxhaven March 11 on her first westbound trip of 1914, arrived in New York in command of a new captain, Commodore Thomas Kier, who succeeds Commodore Hans Ruser. The latter will command the Vaderland, which will make her maiden voyage across the Atlantic on June 4. Ruser is now superintending the finishing touches to the Vaderland. The third ship of the Imperator and Vaderland class, which will be launched in June or July, may be christened the Panama.

Steamer Purchases.—D. T. Helm, of Duluth, has purchased the 2,700-ton steamers Wawatam, Griffin, and Lasalle from the Pittsburgh Steamship Co. The price was not reported, but is understood to have been in the neighborhood of $105,000. The Griffin and Wawatam were built in 1891 and the Lasalle in 1890. Their dimensions are 266 feet keel, 36 feet beam, and 24 feet deep. Mr. Helm bought the Gilchrist steamer Vulcan a year ago and now has a fleet of four vessels. They will be employed in grain and coal trades principally.

St. George Overhaul Complete. — The C. P. R. turbine steamer, St. George, which is to run between St. John, N.B., and Digby, N.S., during the summer months, and in which new turbine engines have just been installed, made her high speed trials from New York recently. Capt. Walsh, of the C.P.R., who witnessed the trials, states that the steamer had made an average speed of over 21 knots on a ten-knot course, and over 22 knots on a one knot course. The St. George on arrival at St. John will remain until commencing her run between that port and Digby.

Toronto, Ont.—The Toronto Harbor Commissioners have decided to spend $171,000 on the dock construction work of the new channel, to connect the Don River with Toronto Bay. Seven tenders

were received, including one from the engineering department of the harbor board. The latter, which was for the foregoing amount, was the lowest, and was accepted. Part of Keating's Channel, is to be utilized for the new channel. Work on the dock construction is to be commenced as soon as the ice breaks up in the spring, and it is estimated it will take five months to complete it.

Toronto, Ont.—An order has been placed with Canadian Fairbanks-Morse Co., of this city, for a new life boat type cabin cruiser, by a well known citizen of Fort William, and it will probably be seen in Thunder Bay about June 1. The new craft has been designed especially for Lake Superior cruising, having a water-tight cockpit and bulkheads to insure a maximum of safety. The general layout of the interior of the cabins will be complete in every detail. The power plant will consist of an eighteen horse power Fairbanks-Morse medium duty type engine and will operate on both gasoline and kerosene.

Windsor, Ont. — Plans have been launched for the organization of a new freight and passenger steamship line, to operate between Sarnia, Wallaceburg, Windsor, and intermediate Canadian points, touching also at Detroit. Among those interested in the company are Harry B. Smith, D. A. Gordon, M.P.; T. B. Dunbar and other Wallaceburg men. The intention is to have a capitalization of $50,000, and to place in service by the 1st of May a steamer accommodating one thousand passengers. Plans are also being laid for the acquisition of a park for excursionists, probably near Walpole Island.

Want Georgian Bay.—Thirty-five hundred citizens from Montreal and district, packing the Monument Nationale at a mass meeting held under the auspices of the Chambre de Commerce, called upon the Dominion Government to proceed with the immediate construction of the Georgian Bay Canal, and protested against the proposed appointment of a commission to inquire into the project. A telegram from the Dominion Federation of Boards of Trade approved the canal. Referring to Toronto's antagonism, Henri Bourassa said there were men there who were always willing to sing "God save the King," but who were also always ready to ally themselves with Americans when it meant increased dividends.

More C.P.R. Boats.—It is understood that negotiations are in progress between the Canadian Government and the C.P.R. with a view to improved steamship services on both the Atlantic and the Pacific. Representatives of the company have had interviews recently with the Minister of Trade and Commerce, Ottawa, and others in regard to the proposal, which will involve a materially increased subsidy, and the construction of faster liners. In the case of the Pacific, it is intended to shorten the time of the passage between Vancouver and the Orient by ten or twelve hours. On her first trip the new steamer Empress of Russia covered the 4,300 miles between Yokohama and Victoria, B.C., in 9 days 5 hours, thus establishing a record.

Inverhuron, Ont.—A delegation of steamship men are planning to wait upon the Dominion Government to ask for the establishing of a harbor of refuge at Inverhuron. The matter has been under discussion for some time, but it is the general feeling, however, that if the Government carry out the improvements and proposed changes at Goderich, it would obviate the necessity of an additional harbor of refuge at Inverhuron.

MOTOR BOAT ON NEW ALLAN LINER "ALSATIAN."
Two of these craft are carried, and each has a wireless outfit.

Inverhuron is nine miles north of Kincardine, and is the most natural harbor on Lake Huron, covering an area of fifty miles. If the Government decided to establish a breakwater at the south side of the point, it would give a harbor covering eighty-five acres and with from twenty to thirty feet of water.

Fredericton, N.B.—The annual meeting of the Victoria Steamship Co. was held here on March 13. The business of the year was gone over, and the financial statement showed a small deficit. The board of directors for the ensuing year shows some changes as a result of the retirement of Secretary-Treasurer Ald. W. J. Osborne; Mr. W. J. McCready being elected to fill the vacancy. Another change in the officers of the company was also made; Mr. Robert Scott being elected managing director, succeeding Mr. E. G. Hoben. The latter will remain on the board, however. The following are the officers: President—R. F. Randolph; Vice-President—W. G. Clarke; Secretary-Treasurer—J. W. McCready; Managing Director—Robt. Scott; Board of Directors—E. G. Hoben and J. J. McCaffrey, Fredericton; F. DeL. Clements, and H. G. Harrison, St. John.

Canadian Wireless Stations.—A report issued by the Canadian Government Emigration Office states that when the new chain of wireless stations, now in course of construction by the Canadian Government, is finished and in operation, it will be possible for a passenger on any incoming steamship to communicate from mid-ocean as far inland as Fort William, Ont. In connection with supplementing the service, the wireless station on the Tarte Pier, Montreal, is to be equipped anew with apparatus having a longer range. All down the St. Lawrence River and Gulf, the Government stations are in regular operation, while the others being built at Toronto, Kingston, and Port Burwell will soon be completed. With eight powerful stations on the Great Lakes operating in conjunction with those at Montreal, Quebec, and on the sea, the wireless system on Canadian waterways will thus be complete, and second to none, it is claimed, in range and efficiency.

Honors for Lost Crew.—With impressive ceremony, a funeral service was read on March 5 for the eleven men who perished with the lost submarine A-7, hope of recovering which has been abandoned by the Admiralty. While the burial rites of the Anglican Church were read aboard the cruiser Forth, standing by over the spot in Plymouth Sound where the A-7 is supposed to be buried in the sand, a duplicate service was read in the Royal Navy barracks at Keyham. Thirteen submarines, most of them of the A class, stood by the Forth while the funeral service was taking place. Their crews stood with bared heads on the decks. Nearby was the royal navy yacht Enchantress, bearing Vice-Admiral J. R. Jellicoe, representing the Admiralty. One thousand officers of the navy and army attended the land services. At the close, the Forth fired three broadsides in salute of the dead and the buglers sounded the "Last Post."

The Polson's Ironworks, Ltd., Toronto, launched on March 4th the first of six steel scows being built for the Quebec Harbor Commissioners. The ice alongside the ways had to be broken up by means of dynamite. The scows are 144 feet long, and have a beam of 42 feet, with a carrying capacity of 500 cubic yards, and are to be used in con-

nection with the Quebec harbor improvements. An order from the Dominion Government for a third steel steam lighter for the Hudson's Bay terminal at Port Nelson has been received by the Polson's Ironworks, Ltd. The vessel will have a length of 120 feet over all and a beam of 21 feet 6 inches, with a 10-foot draught, and is to be delivered at Port Nelson by July 1st, one month later than the two other vessels on hand, which are to be ready at the opening of navigation. The securing of these boats will obviate any further difficulty such as that experienced last year through vessels being unable to lighter their cargoes for lack of proper facilities, and through the impossibility at present of docking large vessels at the port.

Shipwreck Near Halifax, N.S.—The steamer City of Sydney, from New York to St. John's, Nfld., struck on the rocks at Sambro, fifteen miles from Halifax during a dense fog early on March 17, and water in her stokehold put out the fires. Several vessels were dispatched to her assistance and life-savers also put out from Sambro, but had difficulty in locating her in the fog. The tug Rosemary took off eleven of the thirteen passengers and part of the crew of forty, and reported that the Sydney was in a bad position, and likely to become a total wreck. The Sambro Ledges have been the scene of many wrecks, and few vessels that have struck them have come off safely. The ledges extend for nearly two miles from Sambro Head, on which there is a powerful light, a fog signal and wireless station. The Sydney has been running regularly all winter between New York and St. John's, Nfld., calling at Halifax each way. According to wireless reports the Sydney fetched up on Stag Rock, one of the outer ledges, about 4 a.m., and at once began pounding, as the deep ground swell from the Atlantic was crashing onto the rocks. Within a short time the rocks had punctured the bottom. The City of Sydney is of the Red Cross Line and sails under a British flag. She registers 1,640 tons.

"R.M.S. Aquitania" is the title of a very handsome and artistic brochure being distributed by the Cunard Steamship Co., Ltd., as a souvenir of the launching of their latest liner in April, 1913. The illustrations are exceedingly clear, and include views taken during various stages of construction from the laying of the keel to the launching of the vessel. The reading matter, which has been written by E. Veble Chatterton, gives much interesting information regarding the constructional features of the vessel.

MONTREAL HARBOR COMMISSION 1913 REPORT.

IMPROVEMENTS effected by the Montreal Harbor Commission during 1913, necessitating an expenditure of $3,787,430 on capital account, and $1,325,636 on revenue account, against which there were total revenue receipts of $1,361,964, are shown in the annual report of the commission issued March 13 last.

Two notable items on the balance sheet show that during the year the commission decreased its debenture indebtedness by $200,000, and that at the same time the banks carried an overdraft for them of $308,903 on capital account, for which advances had been applied for from the Dominion Government, but not received during the year.

The report shows that during the year a reorganization of the commission's accounting department was effected by establishing a comptroller's department. On the first of May a harbor police department was organized with a view to assisting the police of the city of Montreal in patrolling the harbor during the season of navigation. These took into custody 268 persons during the year.

A new steamship line service to the port was inaugurated when the Compagnie Transatlantique Generale instituted direct sailings between Havre, France, and Montreal, and several new steamers of lines already using the port were put into service. An increase of tonnage over all previous years in ocean-going and inland vessels arriving is shown, and the season of navigation was lengthened by opening 14 days earlier and closing 6 days later than in 1912.

Harbor Improvements.

In the matter of harbor improvements it is shown that the Harbor Commissioners' railway line was completed to high level along the river front from Molson's Creek to Tarte pier. Two permanent transit sheds were finished and opened for traffic on the Tarte pier. Elevator No. 2 and its connecting conveyer system to all berths in the central part of the harbor, was operated during the whole season. Elevator No. 1 also worked satisfactorily, though an addition of one and a half times its storage capacity was being installed.

The drydock site, providing a large basin for the new floating drydock, Duke of Connaught, and a large area of made land for the shipyard, was advanced almost to completion. New quay walls of cribwork and concrete were completed to a length of 2,000 feet, while 2,000 feet was partly completed. Four miles of new railway track was constructed and one mile improved and relaid. The removal of the artificial works at Moffatt's Island was advanced and its ameliorating effect on St. Mary's current towards the close of the season was very marked.

Construction of a large industrial wharf at Pointe-aux-Trembles was begun, two new transit sheds on the high level bulkhead wharves, sections 24 and 25, were also started; a new electric hoist with bridges connecting with the upper storeys of the sheds on the Alexandra pier was built; new paving was laid on portions of the wharves; a start was made in substituting concrete for the superstructure of some of the old wooden piers in the central portion of the harbor, and additions and improvements were made to the various harbor plants. For maintenance work, considerable dredging was done in the channels and basins, the materials dredged up being used in the construction of embankments and for reclaiming land areas for the harbor.

In the last ten years, the tonnage of all vessels arriving in the port has grown from 4,211,672 tons to 8,394,002.

SAILORS' RIGHTS AT SEA.

SOME remarkable advice to seafarers is given in an old Portuguese book, published for the guidance of mariners. Amongst other things it deals with the rights of captains to assault sailors, and the methods in which the attacks are to be legally met.

The sailor is advised to bear calmly any verbal abuse that an irate skipper may hurl at him, but, if words passed to blows, he was to run away into the bows and firmly take his stand beside the anchor chain.

Should an infuriated master, armed with a belaying pin or other lethal weapon, chase him to his stronghold, the mariner was to slip round to the farther side of the chain. Should he still be pursued, he was to call his messmates to witness that the master had broken the rules by circumventing the chain. Then, at last, he was to defend himself—and let us hope he would do it well!

The ship's clerk, a privileged person who acted as bookkeeper, purser and cargo-master, was liable to be branded in the forehead, to lose his right hand, and to forfeit all his property if he made a wrong entry in the ship's book, or connived at such an entry.

A seaman who fell asleep on his watch was only put on a diet of bread and water, unless the offence was committed in hostile waters. In that case he must be stripped naked, flogged by his messmates and ducked thrice in the sea. If he were an officer, however, he would only lose all food except his bread, and have a pail of water flung over him from the head downwards.

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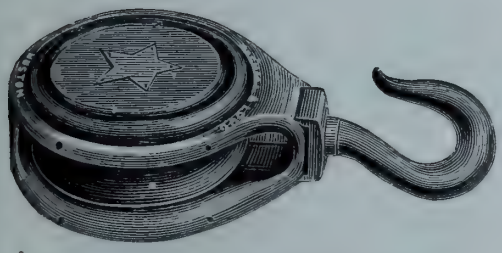

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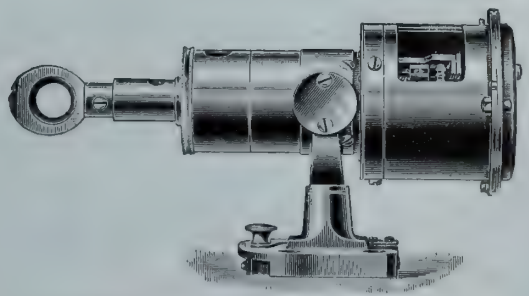
No fogging of vision due to moisture on lens as with outside prisms. No external fittings liable to derangement as with other systems. Clear magnification without eye-strain under all circumstances.



WALKER'S PATENT "CHERUB" II SHIP LOG.

Very accurate and serviceable. Exceptionally strong construction, the working parts being of hardened steel and phosphor bronze. Recommended for speeds up to 16 knots.

ASSOCIATION AND PERSONAL

A Monthly Record of Current Association News and of Individuals Who Have Been More or Less Prominent in Marine Circles

James Carruthers, President Canadian Steamship Lines, has gone to Bermuda.

F. W. Moore has been appointed manager of the Garlock Packing Co., Montreal branch.

F. Orr Lewis, of Canadian Vickers, Ltd., and Lewis Bros., Montreal, has returned home after a business trip to the Old Country.

James Ritchie, who last season acted as deputy to H. H. Gildersleeve, general manager R. & O. Navigation Co. Western Lines, with headquarters at Sarnia, has resigned.

M. P. Fennell, acting secretary-treasurer of the Montreal Harbor Board, has left to join Chairman W. G. Ross in Europe, where they will study harbor conditions.

Captain Joseph Wiggins, an old-time lakes mariner, passed away this month in his 91st year. He was born in Toronto, and made that city his home for the most part of his shore life.

G. W. Ross, chairman of the Montreal Harbor Commission, and Mr. F. W. Cowie, chief engineer, are now at Marseilles on a tour of inspection of the principal European ports.

Captain William McIlwain, Government examiner of master and mates, died in St. Catharines on March 2, aged 87 years. Deceased was Government examiner for twenty-two years.

R. Winslow has been engaged by the Board of Harbor Commissioners, Vancouver, as harbor engineer, and will be retained in that capacity for the present to look after the drafting of plans and other work of a general nature in connection with the harbor.

LICENSED PILOTS.

River St. Lawrence.—Captain Walter Collins, 43 Main Street, Kingston, Ont.; Captain M. McDonald, River Hotel, Kingston, Ont.; Captain Charles J. Martin, 13 Balaclava Street, Kingston, Ont.; Captain T. J. Murphy, 11 William Street, Kingston, Ont.

River St. Lawrence, Bay of Quinte, Murray Canal.—Captain James Murray, 106 Clergy Street, Kingston, Ont.; Capt. James H. Martin, 259 Johnston Street, Kingston, Ont.; John Corkery, 17 Rdieau Street, Kingston, Ont.; Captain Daniel H. Mills, 272 University Avenue, Kingston, Ont.

ASSOCIATIONS

DOMINION MARINE ASSOCIATION.
President—James Playfair, Midland; Counsel—F. King, Kingston, Ont.

GREAT LAKES AND ST. LAWRENCE RIVER RATE COMMITTEE.
Chairman—W. F. Wasley, Gravenhurst, Ont.
Secretary—Jas. Morrison, Montreal.

INTERNATIONAL WATER LINES PASSENGER ASSOCIATION.
President—A. A. Heard, Albany, N.Y.
Secretary—M. R. Nelson, New York. .. ....

THE SHIPPING FEDERATION OF CANADA
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SHIP MASTERS' ASSOCIATION OF CANADA.
Grand Master—Capt. J. H. McMaugh, Toronto, Ont.; Grand Secretary-Treasurer—Capt. H. O. Jackson, 376 Huron St., Toronto.

GRAND COUNCIL, N.A.M.E. OFFICERS.

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Neil J. Morrison, P. O. Box 238, St. John, N.B., Grand Secretary-Treasurer.
F. Reid, Vancouver, B.C., Grand Conductor.
A. J. Ross, Halifax, N.S., Grand Doorkeeper.
James Gillie and A. E. Kennedy, Kingston, Ont., Grand Auditors.

The Polson Ironworks, Toronto, launched a dump scow on March 11. The vessel is one of three being built for the Quebec Harbor Commission, and is 150 ft. long, 40 ft. beam, by 15 ft. deep.

Sir Robert Perks, who has many Canadian financial interests, and warmly advocates the Georgian Bay Canal scheme, left London, Eng., with his son, Malcolm Perks, for Ottawa, on March 12.

Ferdinand de Lesseps' Statute.— The "Matin," Paris, states that Myron Herrick, the United States Ambassador to France, has asked the U.S. Government to erect a statue of Ferdinand de Lesseps at the entrance to the Panama Canal.

Captain Frank Carey retires from the C.P.R. steamship service about the latter part of the present month. For the last 12 years he has been commodore captain of the company's fleet. His first Atlantic voyage was made 51 years ago, since when he has crossed the Atlantic over 600 times.

Elzear Auger, a well-known shipbuilder and designer, 75 years of age, died on March 11 in Quebec. He was for a number of years dock superintendent to the Harbor Commission. He was also an expert yacht builder, and constructed a number of fast sailing yachts.

Gold Watches for Captains.—An Ottawa despatch says that the Minister of Marine, Hon. J. D. Hazen, has authorized the presentation of gold watches, suitably inscribed, to the captains of the steamers Westport and John L. Cann for bravery in rescuing the people from the wrecked steamer Cobequid. The matter of rewards for the crew is under consideration.

Directory of Subordinate Councils for 1914.

Name.	No.	President.	Address.	Secretary.	Address.
Toronto,	1	A. J. Fisher,	707 Bathurst St.	E. A. Prince,	59 Ferrier Ave., Toronto.
St. John,	2	H. E. Berry,		G. T. G. Blewett,	36 Murray Street, St. John, N.B.
Collingwood,	3	W. T. Rennie,	Collingwood,	Robert McQuade,	P.O. Box 97, Collingwood,
Kingston,	4	S. M. Murray,		James Green	
Montreal,	5	A. F. Hamelin,	3210 Le Tang Street,	O. L. Marchand,	St. Vincent de Paul, P.Q.
Victoria,	6	Alex. McNivern,	P. O. Box 234.	Peter Gordon,	808 Blanchard St., Victoria, B.C.
Vancouver,	7	Andrew T. Roy,	1212 Burrard St.,	E. Read,	859 Thurlow St.
Levis,	8	Helaire Mercier,	3 St. Joseph St.	S. G. Guenard.	Lauzon, Levis, P.Q.
Sorel,	9	Geo. Gendron,	Sorel, P.Q..	Al. Charbonneau.	P.O. Box 132, Sorel, P.Q.
Owen Sound,	10	W. Robertson,	1030 4th Ave. East,	Richard McLaren,	447 13th St., Owen Sound.
Windsor,	11	Alex. McDonald,	28 Crawford Ave,	Neil Maitland,	221 London St. W., Windsor, Ont.
Midland,	12	Jos. Silverthorne,		Jno. A. Murphy,	Midland, Ont.
Halifax,	13	D. J. Murray,	Victoria Rd., Dartmouth,	Chas. E. Pearce,	Portland Street, Dartmouth, N.S.
Sault S. Marie,	14	Thos. O'Reilly,	153 Queen St.	Geo. S. Biggar,	43 Grosvenor Ave., Sault Ste. Marie.
Charlottetown,	15	J. F. McGuigan,	38 Queen St.	Lem Winchester.	302 Fitzroy St., Charlottet'n, P.E.I.
Twin City,	16	Arthur Abbey	Fort William, Ont.	John A. Smith.	Fort William, Ont.

J. W. Norcross, general manager of the Canada Steamship Lines to Montreal, who returned from an extensive tour of inspection on March 15, states that the company's fleet was being overhauled and would be all in shape at the opening of navigation. Apart from the new boat to be launched next month, Mr. Norcross said that there were no new developments of interest in the company's affairs.

Each Captain Found Guilty.—The Philadelphia Board of Steamboat Inspectors on March 16 rendered a divided opinion in the trial of Captain Osmyn Berry, charged with negligence in the collision with the steamer Monroe, in which 41 persons lost their lives. One member of the board exonerated Berry and found Captain Edward Johnson, of the Monroe, guilty of "incompetency, negligence and inattention to duty."

Levis No. 8 N.A.M.E.—Officers for the ensuing year were elected as follows, by Levis No. 8 National Association of Marine Engineers:—President, Hilaire Mercier, Bienville; vice-presidents, Eugene Belanger, Joseph Boulanger, Bienville; secretary, S. G. Guenard, Bienville; secretary-treasurer, Thos. Theriault, Lauzon; assistant secretary, Joseph Farlardeau, Bienville; conductor, Odilon Lambert, Bienville; doorkeeper, Jean Fiset, Lauzon; auditors, Francois Labarre, Edgard Samson, Bienville, Levis; members of Council, Joseph Blanchet, Notre Dame de Levis; Michel Latulippe, Lauzon; Alfred Roy, Arthur Carbonneau, Hervey Fortin, Bienville.

Mr. and Mrs. G. E. Fair, who are moving to Toronto, were on March 16 the recipients of a cabinet of silverware and an appreciative address at the hands of representative citizens of Collingwood. Mayor D. C. Barr presided, and short addresses were made by Messrs. M. P. Byrnes, ex-president of the Board of Trade; S. H. Lindsay, S. L. Darroch, president of the Board of Trade; ex-Mayor H. A. Currie, W. A. Hogg, Rev. Dr. Harper, and others. Mr. Fair is manager of the Farrar Transportation Co., the head office of which has been transferred to Toronto.

Stephen J. Murphy, a popular and familiar figure in Toronto shipping circles for over a quarter century, has severed his connection with the recently incorporated Canada Steamship lines. For several years he was travelling passenger agent of the Niagara Navigation Co., then district passenger agent, with headquarters at Niagara Falls, N.Y. Subsequently he was excursion agent of the Richelieu & Ontario lines. With the departure of Mr. Murphy, only one of the original staff of the Niagara Navigation Co. is left in the merger, namely, Jack Foy, who is now representative of the merger in the Western States, with headquarters at Chicago.

Lake Vessel Appointments.—The following appointments have been made to the command of the steamers of the Sarnia fleet of the Northern Navigation fleet, sailing to Duluth, Porth Arthur and Fort William:—Noronic, Captain R. D. Foote, Harmonic, Captain A. L. Campbell; Huronic, Capt. A. L. Wright. Chief Engineer S. Brisbin, who will take charge of the Noronic's engine room, was in Port Arthur all last summer supervising the installation of the machinery equipment. The Georgian Bay fleet captains are announced as follows: — Steamer Germanic, Capt. F. G. Moles; City of Midland, Capt. J. D. Montgomery; Waubic, Capt. G. W. Kinnie; Doric, Capt. Acheson; Ionic, Capt. O. Wayne. consistency.

WHO'S WHO.

WILLIAM NEWMAN,
Manager, Polson Iron Works, Toronto.

George Burrows, who has for a number of years been connected with the engineering department of Vickers, Ltd., Barrow-in-Furness, has accepted a responsible appointment with the Canadian Vickers, Ltd., Montreal. A presentation was made him by his many friends in Barrow in the mechanics' drawing office a few weeks ago. Mr. A. Johnstone occupied the chair, and, after a few eulogising remarks, called on Mr. Stenhouse to make the presentation, which consisted of a handsome double gold albert, with a gold medallion suitably inscribed, together with a christening present for his daughter, consisting of a silver knife, fork, and spoon in a case. Mr. Burrows made a suitable reply of thanks, and said that while he would do his best for his new employers he would never forget his many friends at Barrow, nor his happy association with Messrs. Vickers, Ltd. At a supper to local referees in connection with football, in which game Mr. Burrows took a deep interest, he was presented with a handsome gold medal by the Furness Referees' Association.

C. P. R. Lake Vessel Appointments.—The following appointments have been made for the ensuing season on C.P.R. lake steamships:—

Steamer Assiniboia— Master, James McCannel; 1st officer, J. P. Pearson; 2nd officer, C. Griffin; chief engineer, A. A. Cameron; 2nd engineer, W. S. Struthers; 3rd engineer, R. White; purser, W. Bethune; chief steward, W. H. Whittemore.

Steamer Keewatin — Master, Malcolm McPhee; 1st officer, J. Bishop; chief engineer, Wm. Lewis; 2nd engineer, G. R. Darby; 3rd engineer, D. Ramsey; purser, J. E. Laine; chief steward, Geo. H. Fisk.

Steamer Alberta—Master, F. J. Davis; 1st officer, J. W. McCannel; 2nd officer, N. Spencer; chief engineer, C. Butterworth; 2nd engineer, F. Lumley; purser, A. Gallagher; chief steward, E. R. McCallum.

Steamer Manitoba. — Master, John McIntyre; 1st officer, F. Middleton; chief engineer, R. Sinclair; 2nd engineer, R. Blair; purser, G. Bethune; chief steward, E. G. Simpson.

Steamer Athbasca — Master, J. B. Currie; 1st officer, M. McKay; 2nd officer, L. Webb; chief engineer, Wm. Lockerbie; second engineer, M. Brechin; purser, C. S. Miers; chief steward, D. A. Sutherland.

St. Lawrence Navigation Opening.—Advices received at the Harbor Commission offices, Montreal, from old pilots and river men give expectation that the ice will move out about April 15. This will be about the average time, and will be a considerable achievement, if it comes off, since the ice this year is unusually thick owing to the long periods of heavy frost and lack of deep snow. It is stated that the ice in the harbor is about forty-eight inches thick, while in the river around the Boucherville Islands it was even thicker, the accumulation of floating ice having frozen up there into heavy masses.

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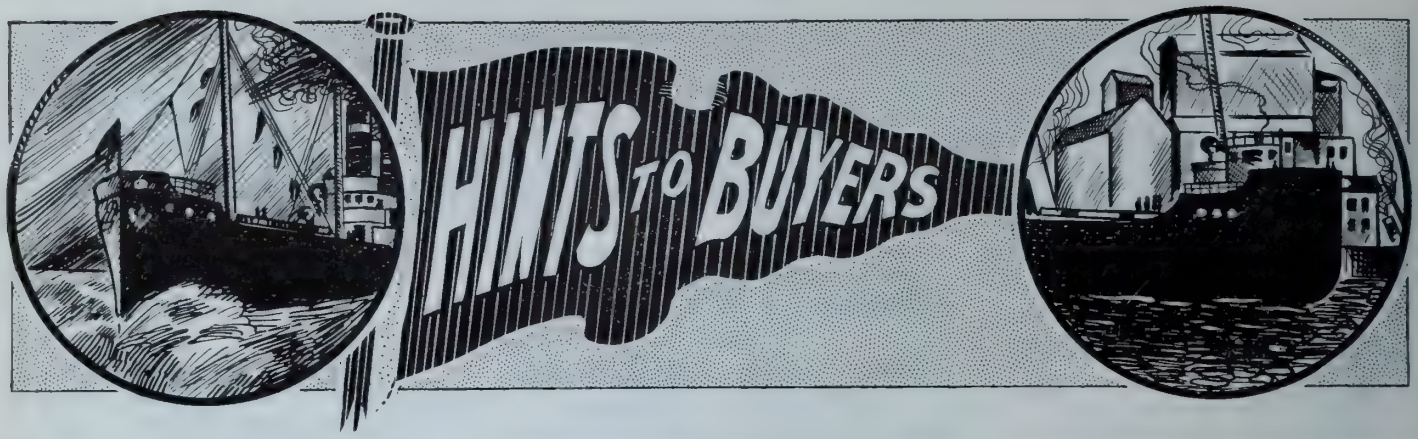

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Vol. IV. Publication Office, Toronto—April, 1914 No. 4

Dredge "Port Nelson" Built by Polson Iron Works Limited, of Toronto

Order placed by Department of Railways and Canals, Dominion Government on the 1st day of April, 1913. Dredge reached Port Nelson after voyage of 3500 miles on the 27th of September.

T. W. No. 1.

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Col Miller

Polson Iron Works Limited, TORONTO ONT.

Dredge portnelson in spite of many difficulties encountered enroute arrived safely on Saturday twenty seventh time of passage sydney bar to portnelson bar twenty days six hours. Dredge behaved splendidly throughout voyage congratulate you on output.

H.B.Saunders

1010am

Telegram sent by Captain Saunders, the well-known marine surveyor and wrecking master, who was placed by the Department in full charge of towing of dredge to Port Nelson.

Lake Vessel "W. Grant Morden," Launched at Port Arthur

A new record in Canadian shipbuilding was established in the building and successful launch of a mammoth freighter for service on the upper North American lakes, by the Western Drydock & Shipbuilding Co., from their yard at Port Arthur. That the double achievement is highly complimentary to the shipyard management goes without saying, while it gives additional evidence of the gradual development and progress being made towards a more deep-rooted establishment in our midst of a much desired industry.

IN the presence of several thousand spectators, many of whom were from a distance, the giant freight steamer W. Grant Morden, named in honor of the organizer of the Canada Steamship Lines, Ltd., was successfully launched from the shipyard of the Western Drydock & Shipbuilding Co., Port Arthur, on the afternoon of Saturday, April 4.

The launching party on the platform at the bow of the vessel included Lady Williams-Taylor, wife of the general manager of the Bank of Montreal, who gracefully performed the christening ceremony; Lady Allan, wife of Sir H. Montagu Allan, chairman of the Allan Line Steamship Co.; Mrs. G. C. Henshaw, mother of Mrs. W. Grant Morden; Mr. Jas. Carruthers, president of the Canada Steamship Lines; Mr. and Mrs. J. W. Norcross, managing director of the Canada Steamship Lines; Prince Hohenlohe Schillings Furst, of the German Consulate, Montreal; Miss Brenda Williams-Taylor, Mr. R. M. Wolvin, of Winnipeg, Western manager for the Canada Steamship Lines; Hon. J. P. B. Casgrain, of Montreal; F. Percy Smith, assistant to Mr. James Carruthers; Mr. E. Cox, press representative for the company; G. Carruthers, of Winnipeg, son of Mr. James Carruthers; Mr. W. Tilt, manager of the Winnipeg office of the Carruthers Grain Co.; Mr. and Mrs. J. Wolvin, Mr. and Mrs. Irving Fenn, Miss Charlotte Whalen, A. Whalen, Mr. W. H. Nelson, the Misses Nelson, Miss Dunbar, Regina; Mr. and Mrs. W. O. Matthews, Mr. and Mrs. J. E. Nelson, and Ald. R. A. Burriss.

Following the successful committal of the vessel to her native element a banquet was tendered the launching party by the builders in the Prince Arthur Hotel. This function was also one of marked success and enthusiasm, an unusual and happy feature being the participation in the speech-making by two of the fair guests, Lady Frederick Williams-Taylor and her sister, Mrs. Henshaw. There was good cheer in the intimation of Mr. James Carruthers that probably the Canada Steamships Lines would before long give another contract to the local plant. Regret was expressed at the unavoidable absence of Mr. and Mrs. W. Grant Morden and of Mr. James Whalen.

Mr. R. B. Wallace, of Chicago, general manager of the American Shipbuilding Co., who was an efficient and genial chairman and toastmaster, had on his right hand Lady Frederick Williams-Taylor, Mr. J. W. Norcross, Mrs. John Wolvin, Colonel Ray, Mrs. J. W. Norcross, and Senator Casgrain; and on his left, Lady Montagu Allan, Mr. James Carruthers, Mrs. Henshaw, Prince Hohenlohe Schillings Furst, Miss Brenda Taylor, and Mr. George Carruthers.

The toast of "The King" having been duly honored, there followed that of the City of Port Arthur, to which Colonel Ray responded on behalf of Mayor Oliver, who was unavoidably absent. The city, he said, was glad to give a cordial greeting to the prominent business men present, and especially glad to welcome the ladies. The city was always willing to meet more than half way those who

BOW VIEW OF LAUNCH, LAKE VESSEL "W. GRANT MORDEN."

became interested in the possibilities of Port Arthur; to welcome not only the men but their millions. He assured them of plenty of scope for their enterprise.

Mr. James Carruthers, replying to the toast of the Canada Steamship Lines, of which he is president, recalled that seventy years ago a number of farmers in the Richelieu Valley, wishing better facilities for carrying their products to Montreal, organized with a capital of $35,000, and acquired one steamer and a barge. This was the foundation of the Richelieu & Ontario Navigation Co. Today the Canada Steamship Lines, Ltd., had 100 passenger and freight boats, extending from the head of the Great Lakes to Montreal, Quebec, New York, the West Indies, British Guiana, and South America—truly a wonderful development. Last year, the Canadian West produced 450,000,000 bushels of grain, and in ten years that amount would be doubled. Port Arthur and Fort William shipped out last year over 200,000,000 bushels of grain and that amount, too, would be doubled in a decade. As only ten per cent. of the land of the West was under cultivation, these estimates were not extravagant. "I hope before long," said Mr. Carruthers, "that the enterprising Western Drydock & Shipbuilding Co. will receive another contract from the Canada Steamship Lines."

Senator Casgrain spoke glowingly of the position and prospects of Port Arthur. He was here forty years ago and noted the wonderful improvements, humorously remarking that even climatic conditions had changed, as he noticed boats were now navigating the harbor where there was only solid ice at the same season forty years ago. The Senator paid a high compliment to Mr. Morden. This young man of 33 or 34 had shown marvellous perseverance and ability in bringing about one of the greatest consolidations of navigation lines that ever existed. There was no man living whose name was worthier to be given to the largest and longest steamer on fresh water. He did not understand why the Government did not bonus shipbuilding; it subsidized railways and canals; why not the building of ships which were equally necessary? Port Arthur and Fort William were the sixth ports of the world, and he dreamed of the time when with the aid of the Georgian Bay Canal, ships from Europe would steam up to the docks at the former city.

The toast to Mr. W. Grant Morden brought a gracefully-worded response from Mrs. Henshaw, sister of Lady Frederick Williams-Taylor and mother of Mrs. Morden. The ties of kinship, she said, forbade her to speak of Mr. Morden and his achievements, but on behalf of her son-in-law and daughter she thanked the company for the enthusiasm with which the toast had been greeted. The beautiful vessel bearing Mr. Morden's name had been the realization of one of his ideals. Mrs. Henshaw alluded to the unrivalled strategical position of Port Arthur in relation to commerce and transportation.

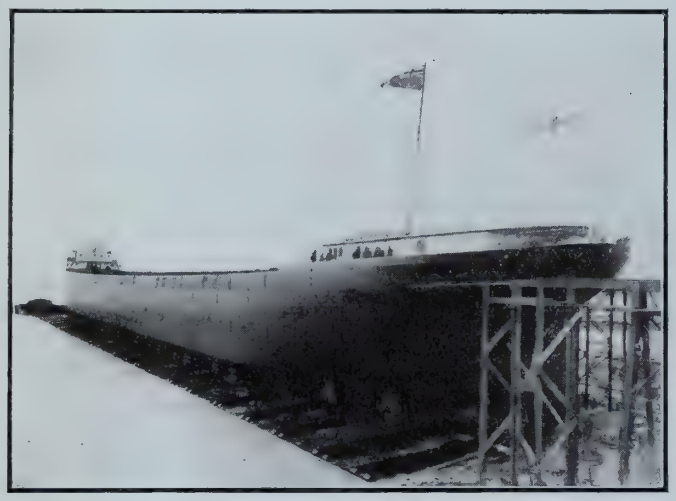
Mr. Carruthers proposed the toast of "The Western Drydock & Shipbuilding Co." He remarked that only six months had elapsed since the company launched the largest passenger steamer on the lakes, and now it had launched the largest freight steamer on inland waters. That was a remarkable record in shipbuilding and he congratulated Port Arthur on having such an enterprising company. The industry needed skilled labor and he thought it was one of the finest that any city could have. Port Arthur was particularly favored in her position, and with the development of the western country, her shipbuilding plant had an assured and expanding future.

To the toast of "The Ladies" proposed by Mr. Wallace, Lady Williams-Taylor replied in a neat impromptu speech, thanking the Western Drydock & Shipbuilding Co. and the Canada Steamship Lines for their courtesies and hospitality. Mr. Roy Wolvin, and Mr. George Carruthers, also responded.

Those present enthusiastically honored the toast to Mr. James Whalen, which was proposed by Mr. W. O. Matthews, who said it was due to Mr. Whalen's foresight, ability and courage that the shipbuilding industry was established in Port Arthur.

Vessel Particulars.

The W. Grant Morden has room for 585,000 bushels of oats, or approximately 20 trains of 30 cars each. She is 625 feet long, 59 feet beam and 32 feet deep, with a 5½-ft. water bottom and side tank extending from the keel up to the main deck, and from the collision bulkhead back to the engine bulkhead. This is divided by a centre keelson, side bulkhead and solid floors into 15 watertight compartments, which may be flooded or pumped out individually, as conditions may require. The hull construction is on the Isherwood system, consisting of longitudinal frames, with transverse sections of plate and angle, spaced every 12 feet. The cargo hold, extending to a length of 436 feet, is divided into six compartments by five steel bulkheads, entrance to the different sections being gained by 38 steel hatches, spaced 12 feet centres, which open from the spar deck. These hatches are 9 ft. wide by 41½ ft. long, and have folding sectional steel-plate covers, operated by steel cables from two deck winches, and clamped down with a patent hatch fastener, especially designed for the purpose for this type of cover.



THE "W. GRANT MORDEN" ON THE WAYS.

STERN VIEW OF LAUNCH.

Machinery Equipment.

The propelling machinery consists of one vertical triple expansion engine, with cylinders, 24-39-65 ins. diameter, by 42 ins. stroke. The H.P. cylinder is located in the centre between the I.P. and the L.P., and the designed indicated horse-power is 2,000, at 85 revolutions per minute. Steam at 170 pounds pressure is furnished by two Scotch type boilers, each 16 ft. diameter by 11½ ft. long, working under induced draught.

The steering engine is of the direct-acting type, with 9-in. diameter by 9-in. stroke cylinders, operating through telemotor gear.

The electric lighting plant consists of two 15 k.w. generating sets installed in the engine-room, with separate circuits for the different parts of the ship, including electric mast-head light, stern and side lights, etc., and all so arranged that should any of them go out, the fact will be instantly noted in the wheel-house by pilot lights there installed becoming lighted. One of the two 10 by 36-in. whistles will also be electrically controlled. A feature very seldom found in this class freighters will be the installation of an ice machine large enough for refrigerator coils and ice tank of two-ton capacity.

Furnishings and Equipment.

The spar deck forward is fitted up for passengers, and is finished in full panel of mahogany. It contains four state-rooms and bath, opening off a large reception-room, which communicates by stairs to an observation room on the forecastle deck, directly overhead. The captain's quarters in the texas are finished in quartered oak, and include office, bedroom and bath, with stairway leading directly overhead into the pilot house.

The crew quarters forward are located on the main deck, and are finished in oak, with white pine ceilings, each room containing berths for two. The mate will have a separate room. These quarters include bathroom, shower bath and large reading-room.

The after deck house contains a private dining-room for passengers, finished in quartered oak, with white pine ceiling, dining-room for officers, and mess-room for crew.

The chief engineer's quarters consist of an office, bedroom and bath, and forward of these are the assistant engineers', oilers' and firemen's rooms in separate quarters on starboard side. On the port side are the quarters for deck hands and stewards; also the galley and ice box. The crew will number 31.

NEW ALLAN LINER "CALGARIAN"

THE speed and other trials of the new Allan liner Calgarian were carried out on the Clyde on March 16th, and the results obtained were admitted by all on board to reflect the highest credit upon the builders—the Fairfield Shipbuilding & Engineering Co, Govan.

To test the engines, seven double runs were made on the Skelmorlie measured mile, when, starting with a speed of 11 knots, the machinery was gradually let out until the speed reached 21¼ knots, which is over 2 knots in excess of that which will be called for in regular service. The mean speed on the last double run was stated to be 20.634 knots, which is a highly satisfactory performance. The manoeuvring trials were equally successful, a complete circle to starboard being accomplished in 4 min. 35 sec., and one to port in 3 min. 45 sec.

These achievements of the new vessel were watched with close interest by a large number of critical observers, those on board including Alex. Gracie, chairman of the Fairfield Company; A. W. Sampson, director and shipyard manager; A. Cleghorn, engineering manager; P. A. Hillhouse, naval architect; Sir John H. Biles, Major H. Maitland Kersey, a director of the Allan Line; J. Foster King, chief surveyor of the British Corporation Registry; A. M. Gordon, naval architect to the Allan Line, and George Crawley, who is responsible for the decorative scheme of the vessel.

Vessel Features.

The Calgarian, like her sister-ship, the Alsatian, is a quadruple-screw turbine steamer of about 18,500 tons. She is 600 ft. in length, 72 ft. in breadth; and 54 ft. in depth to the bridge deck. One of the leading features of both vessels is, of course, the cruiser stern. This type of stern has been severely tested in the case of the Alsatian, and has earned unqualified approval during heavy weather. Among its advantages are that it increases the passenger deck accommodation, gives strength of structure aft and efficiency in steering, reduces vibration, and prevents fouling of the propellers.

The sub-division of the vessel has been carried out on an exceptionally elaborate scale; in fact, the provision of watertight doors and watertight decks is so generous that there would be little likelihood of the ship foundering even if several compartments were pierced. The inner bottom extends the full length of the ship, and is carried well up the sides as a safeguard against damage through grounding. All the bulkhead openings are fitted with Stone-Lloyd doors, which can be closed simultaneously from the bridge in case of emergency. Other safety devices include submarine signalling and a long-distance wireless installation. There is a very complete equipment of British Engelhardt patent decked lifeboats, and two motor launches fitted with wireless telegraphy are carried. The equipment of the vessel is, indeed, exceptionally thorough, an interesting feature being a motor-driven sounding machine supplied by Kelvin, Bottomley & Baird, Ltd.; that firm having also fitted their patent compasses.

Accommodation Features.

Accommodation is provided for 250 first-class, 500 second-class, and 1,000 third-class passengers and, in addition, the ship will carry a crew of about 450 persons. In each class, the decoration and standard of comfort is exceptionally high. The first-class berths have been

"CALGARIAN" PROCEEDING DOWN THE CLYDE TO START HER TRIALS.

designed in suites, special cabins, one-berth and two-berth staterooms. There are four sets of en-suite cabins, each consisting of two bedrooms, sitting-room, bath and dressing-rooms. Each sitting-room has two large couches, writing table, concealed wash-basin, and luxurious furniture. Eight special cabins are provided with bathrooms adjoining, and hot and cold water taps supply the wash-basins. The public rooms comprise dining-room on the shelter deck, library, lounge, card-room and lower smoking-room on upper promenade deck, verandah cafe, and upper smoking-room and gymnasium on boat deck.

Decoration Feature.

The decorations of this ship are in marked contrast to those of the Alsatian, the aim having been to give a simpler and more domestic effect than in the sister vessel. The style adopted throughout is Georgian. The dining saloon is of studied simplicity, one noteworthy feature being the single order of Corinthian columns which rise through both storeys round the central well; the only ornament being a wrought iron balcony, a good example of English smiths' work. The lounge is an example of the more sumptuous decoration fashionable in the time of George II., and contains a fine carved mantelpiece and overmantel.

A special feature in the card-room is a handsome painting by Mr. Phillip Connard, let into the overmantel. The smoking-room is in French walnut, and somewhat earlier in period than the other decorations in the ship. The mantelpiece, with reproductions of an old Vauxhall glass mirror, is somewhat similar in character to that in the King's state dressing-room at Hampton Court Palace.

Machinery Feature.

The propelling machinery consists of Parsons' compound steam turbines arranged in series on four shafts. By thus distributing the power, vibration is reduced to a minimum. Each of the four propellers is comparatively small in size, though capable of driving the ship at a high rate. The four turbines include one high-pressure type, one intermediate, and two low-pressure, which latter drive the inner shafts and have incorporated in the casting of each an astern turbine. Steam is supplied direct from the boilers, and arrangements are made so that each shaft can be operated separately.

The auxiliary machinery, consisting of pumps, etc., is of the latest type, and with the main machinery is situated in one water-tight compartment.

Steam is supplied by six large double-ended and four single-ended boilers working under forced draught and at high pressure. The Calgarian, it should be added, has been built to the highest class of the British Corporation Registry.

LAUNCH OF DIPPER DREDGE.

ON April 9, there was launched from the shipyard of M. Beatty & Sons, Ltd., Welland, Ont., a dipper dredge which has been built to the order of the C. S. Boone Dredging & Construction Co., Toronto.

The vessel, of steel construction, crane type with crane 40 feet long, is 100 ft. long, 40 ft. beam, 10 ft. deep at bow and 8 ft. deep at stern. The dipper is of 5 cubic yards capacity, with dipper handle 61 ft. long, which allows it to make 40 ft. of water. The main engine has two 15 ins. bore cylinders of 15 ins. stroke and is served by a Scotch marine type boiler 10 ft. diameter by 12 ft. long.

Each bow anchor or spud is operated by an independent, compound-geared reversible engine, with 10 ins. bore cylinder by 10 ins. stroke. The anchors are raised and pinned up by steel cables. The engine for handling the stern anchor is compound geared, with 9 ins. bore cylinder by 9 ins. stroke. Located on each side of the deck forward is a double cylinder 7 ins. bore by 7 ins. stroke, triple friction drum engine which will be used for warping the scows into position.

The dredge is expected to be completed and ready for towing by May 1.

BUOY SERVICE TO AN AMERICAN TUG.

ON the orders of the day being called in the Federal Parliament on April 8, Mr. F. F. Pardee directed the attention of the Minister of Marine and Fisheries to a report that the awarding of the contract for buoy service on the Detroit River had been made, contrary to conditions, to one who was not the lowest tenderer, and to a tug that was an American and not a Canadian bottom. Mr. Pardee asked an investigation.

Hon. Mr. Hazen complained that the member had not given the customary two days' notice of his demand. He maintained that the Government had asked for tenders and given the contract to Kenneth Fraser as the lowest tenderer. He confessed, however, that the tug had turnd out to be an American one, but Mr. Fraser had promised to have steps taken to have it registered in Canada, which involved the full procedure of examination and filing of papers.

"Will that not make it late for the service?" asked Sir Wilfrid Laurier. Mr. Hazen did not answer, and Mr. Pardee gave indication of his intention to probe the matter further.

CANADIAN SHIPBUILDING PROMOTION.

WHILE the Borden Government is ready and desirous to give every reasonable encouragement to the promotion of the shipbuilding industry in Canada, and will insist that all vessels for the Canadian service be built within the confines of the Dominion in future, it has no intention of establishing a precedent by subsidizing wealthy and powerful British concerns to enter the Canadian field and compete with this added advantage against the companies already established. This was the substance of Hon. L. P. Pelletier's reply on April 11, to a delegation of Quebec and Levis citizens who interviewed him with regard to the establishment of a branch of the Armstrong firm at Lauzon, where the new drydock is to be built.

Mr. Gavel, president of the Levis Board of Trade and member of the Quebec Harbor Commission, put the case for a subsidy before the Minister, telling of the negotiations which are being carried on with the Armstrong firm, and urging that a steel shipbuilding plant would be almost a necessary accessory to the drydock, as the repair of damaged vessels would call for the permanent employment of a staff of experienced shipwrights and a well-equipped plant. The speakers pointed out that in most of the great ports of the world a shipbuilding plant was complementary to a drydock. They recalled the fact that in the last century Quebec was a great shipbuilding centre and Canadian-constructed vessels had gone out all over the world. When steel had taken the place of wood, however, this industry had disappeared, but they considered that the time was ripe for giving an impulse to shipbuilding and the importance of the St. Lawrence warranted it.

Will Have Vessels Built Here.

Hon. L. P. Pelletier said in reply that the Government fully recognized the importance of encouraging this industry, and all Government vessels would in future be built in Canada. He would do everything reasonable to help the industry, and he was glad to hear that the people of Quebec and Levis were negotiating with the Armstrongs and hoped to induce them to establish a branch at Lauzon. The Armstrongs were a rich and powerful concern, and needed no monetary assistance from the Government. Besides, the people of Canada were against the giving of subsidies to wealthy outside firms, and thus discriminating against the existing Canadian enterprises, nor must it be forgotten that there was already more than forty millions invested in these enterprises.

Some Leading Features of the White Star Liner "Britannic"

While no attempt has been made to materially enlarge the main dimensions of the new ship nor to install power equipment to secure increased speed as compared with her sister liner the "Olympic," there are abundantly evident, nevertheless, marked advances in structural detail and arrangement to be noted, all of which have been born of experience in the construction and service of mammoth vessels, and having as their ideal increased seaworthiness, and therefore a higher degree of comfort for passengers and crew.

MISCELLANEOUS ELECTRICAL SERVICES.

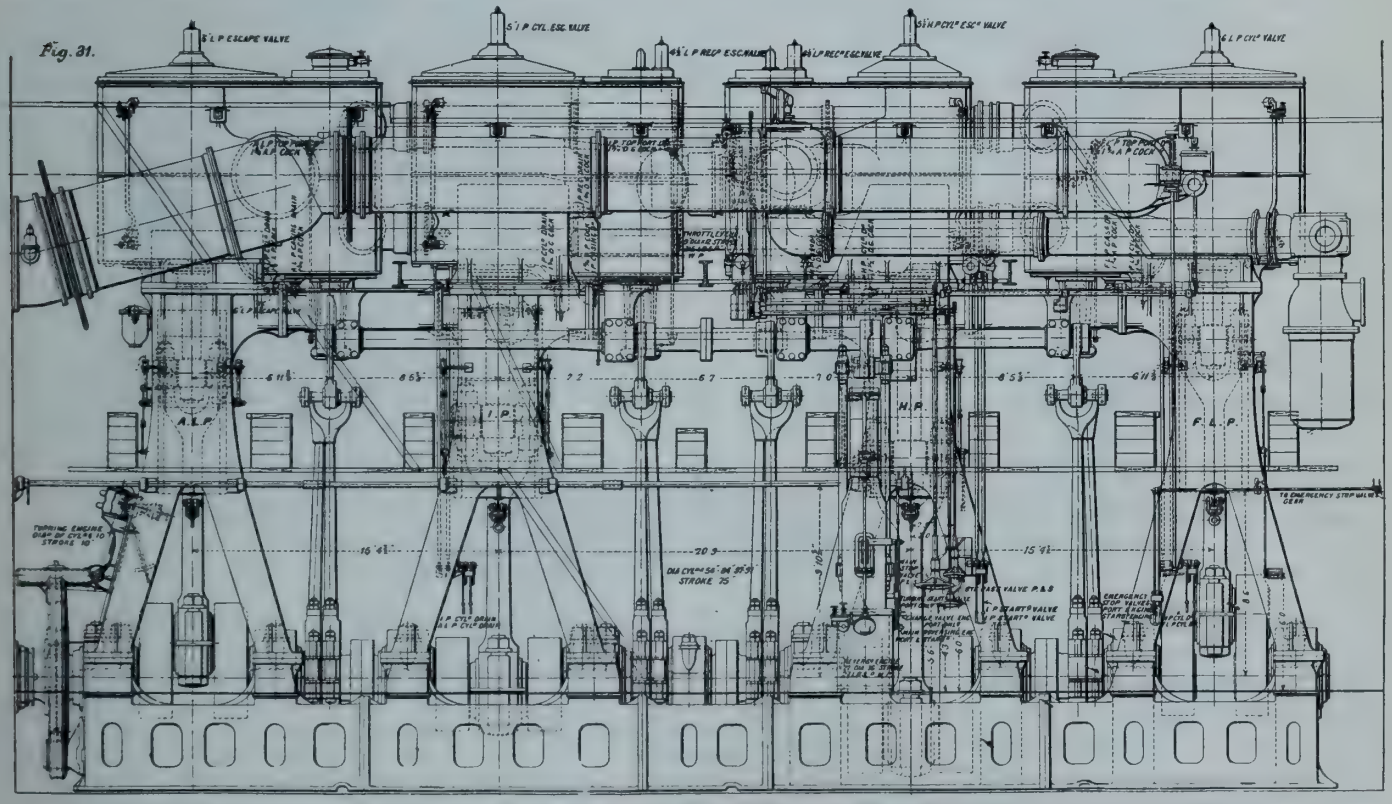
THE electrical installation on board the Britannic is on the single-wire system. Low return wires are run from the bow to abaft the turbine-room. The mains from the switchboard in the central power station are carried up in two water-tight trunks 7 ft. by 3 ft., with a central ventilation passage between them, extending from the electric-engine room to the boat-deck. Connections are made to master-boxes which are placed in the adjoining second-class companion-way. From these boxes branch wiring is led to distributing-boxes throughout the ship. Much of the current is used for ventilating-fans, to supply warm or cold air, according to the season of the year. The motors are operated from pilot-controls, brought together in central positions, so as to be easily manipulated. Pilot-lamps at the controlling station indicate not only whether the fans are running, but, by reason of the density of the light, the speed at which they are being rotated.

In the reciprocating-engine room there are five large ventilating-fans, in the turbine-room one double-inlet fan, and in each of the two electric-engine rooms a double-inlet fan. For the ventilation of the stokeholds there are twelve fans, two in each boiler-room. These range from 15 to 30 brake horse-power. They are situated at the middle-deck level, and are operated by pilot-control from the engine-room. There are also a large number of auxiliary electrically-driven machines throughout the ship. The turbine-casing and rotor-raising gear are electrically worked.

In connection with the sanitation arrangements there are sixteen "stereophagus" pumps and in addition to the four first-class and one second-class passenger elevators driven by 6-horse-power motors, there is a hoist for dealing with mails between the post-office and the mail-room, an elevator in connection with the officers' pantry, another connected with the restaurant, and several between the store-rooms and the main galley.

The electric heating throughout the ship involves a large number of electric heaters in the first-class state-rooms, all under the control of the passenger, while in the entrances there are radiators ranging in capacity from 3,000 watts to 6,000 watts. There are six electric cranes, each capable of lifting 50 cwt. at a speed of 160 ft. per minute, and five cargo winches with a capacity of 3 tons. The two whistles are electrically controlled on the Willett-Bruce principle; the position of the rudder is indicated electrically on the bridge; the sounding-machine is electrically actuated, and electricity is also required for the submarine signalling apparatus.

The temperature of the hot fresh and salt-water supply is controlled by thermostat, and electrically-controlled valves maintain the temperature at a predetermined point. The clocks throughout the ship are electrically controlled from one of two master-clocks on the captain's bridge. Electricity is also required for two loud-speaking telephones for navigating the ship, and for communication with the engine-room, while a system of internal telephones is installed on a central exchange. These may be coupled up to the land circuits at Southampton or New York. There are, as already indicated, electric baths in connection with



LONGITUDINAL ELEVATION, MAIN RECIPROCATING ENGINES, WHITE STAR LINER "BRITANNIC."

the Turkish baths, while the pneumatic conveyors for handling messages from the Marconi room to the inquiry office and purser's room are electrically controlled. Indeed, it would be almost impossible to exhaust the list of uses to which electricity is put, down to the manipulation of a clothes-pressing machine and electric iron and curling tongs.

Marconi Equipment.

In this connection it may be said that the Marconi installation has been designed to transmit over 2,000 miles under favorable conditions. The antennæ are carried on the masts, which rise to a height of 205 ft. above the average load line, so that wires will be 25 ft. above the top of the funnels and therefore beyond reach of the hot gases.

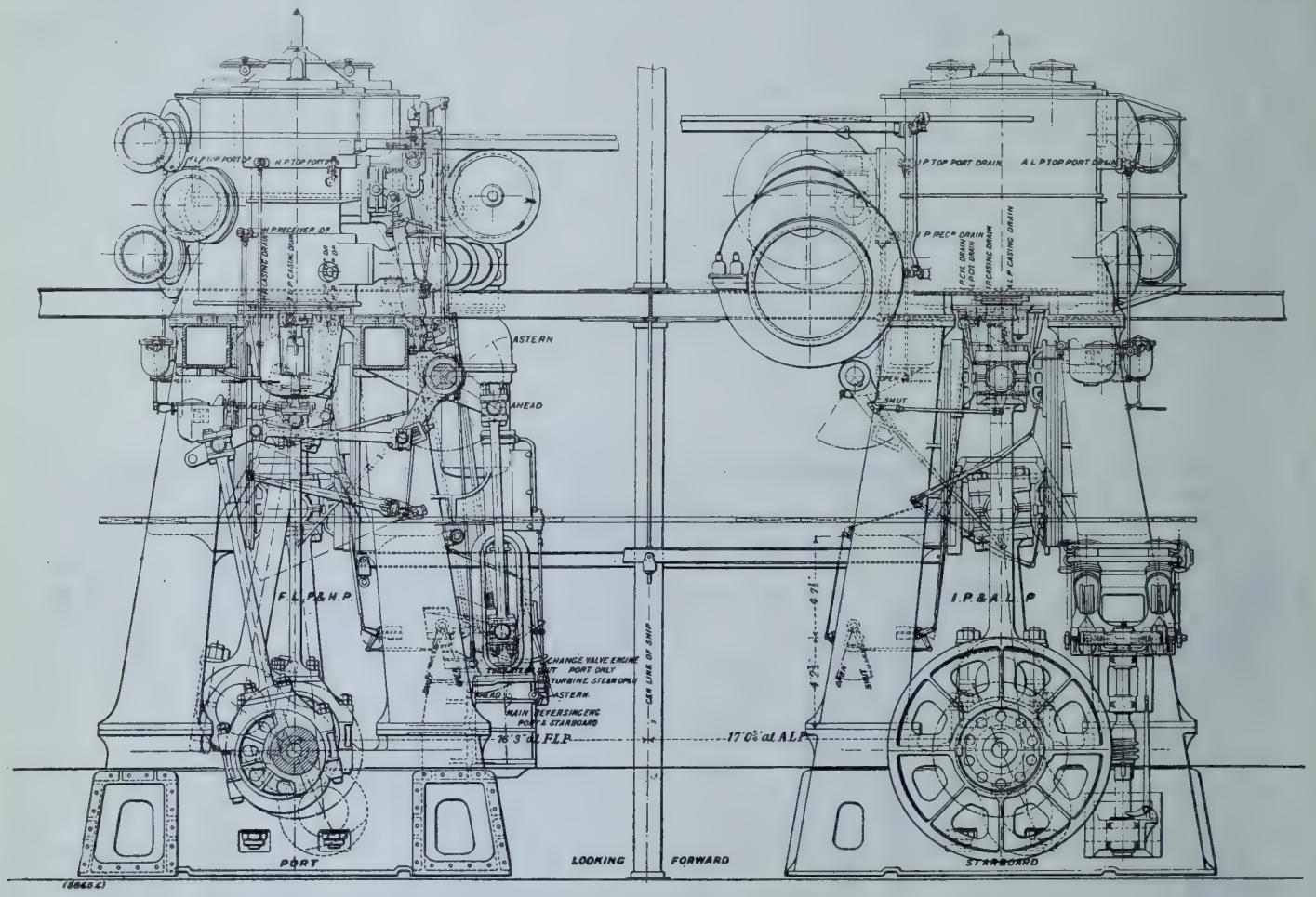
Propelling Machinery Arrangement.

The propelling machinery is arranged generally as in the Olympic. There are six boiler-rooms. In No. 1 room, that nearest the engines, there are five single-ended boilers, with their backs to the engine-room bulkhead. In each of the rooms Nos. 2 to 5 there are five double-ended boilers, athwartship in one row, and in No. 6 room four boilers, as here the "fining" of the lines of the ship reduces the width available. The boilers in Nos. 1 and 2 are arranged with uptakes to convey the gases into the third funnel from the bow; those in Nos. 3 and 4 exhaust similarly into the second funnel, and Nos. 5 and 6 into the forward funnel. The uptakes are fitted with expansion joints over the boilers in the form of a sleeve, with holes for sliding-bolts.

The funnels, which rise to a height of 160 ft. from the wing furnace bars, are 25 ft. 6 in. by 19 ft. 9 in. in external dimensions, the inner casing being proportioned to suit the number of furnaces in the groups of boilers respectively exhausting their gases into them. Stone's ash-expellers have been fitted—one in each of the six boiler-rooms, and, in addition, there are four ash-hoists of the Railton & Campbell type. The coal-bunkers are arranged athwartship on each side of the transverse bulkheads separating the boiler-rooms. This minimizes the amount of coal-trimming, and the stoker gets fuel from a bunker-door opposite the end of each boiler. There is also a bunker at the forward end of No. 6 boiler-room. In addition, there is a fore-and-aft bunker at the lower-deck level along each side of the ship. The ship is coaled through special doors on the side of the hull, with communications to the fore-and-aft and the athwartship bunkers.

The steam-piping arrangement has had special attention. There is a main pipe on the port and starboard sides respectively, and each takes steam approximately from half of each row of boilers. There are cross-connections between the mains in each boiler-room, with stop-valves so arranged that any section of the main, with the boilers connected to it, can be cut out. Thus, any of the boilers can be shut down without affecting the remainder of the steam supply to the main. On the boiler-room side of the bulkhead dividing the engine from the boiler-rooms, a Cockburn patent emergency valve is fitted, which can be closed in a few seconds. On the engine-room side of the same bulkhead there is for each main a steam-separator, which is automatically drained by means of traps. Above it is the main stop bulkhead valve, while on the reciprocating engine itself is the usual main stop valve.

The twin reciprocating engines, of the four-cylinder triple-expansion type, are in one engine-room, with the usual feed, sanitary and bilge pumps and all auxil-



END ELEVATION, MAIN RECIPROCATING ENGINES, WHITE STAR LINER "BRITANNIC."

aries associated with the boiler feed, the refrigerating machinery, and, on the lower deck level, a workshop, having a large lathe, shaping-machine, drilling machine, grindstone, emery wheel, etc., operated from a shaft driven by an electric motor. The principal difference, apart from the increased size of the main engines and the auxiliaries, is in the substitution of gravitation filters, by J. H. Carruthers & Co., Glasgow, for pressure filters, on the discharge side of the feed-pumps. This necessitates a slight rearrangement in the position of the main feed-pumps and other auxiliaries. Again, instead of all three evaporators being on the starboard side, one has been placed on the port side.

The exhaust-turbine driving the centre shaft is located, as in the Olympic, in a separate compartment abaft the reciprocating engine-room, with the change-valves for diverting the exhaust steam from the reciprocating engines to the turbines or direct to the condensers. A sluice-valve is fitted in the eduction-pipes between the turbines and the two condensers to enable either condenser to be shut off. The electric generating station, as already stated, occupies two compartments still further aft.

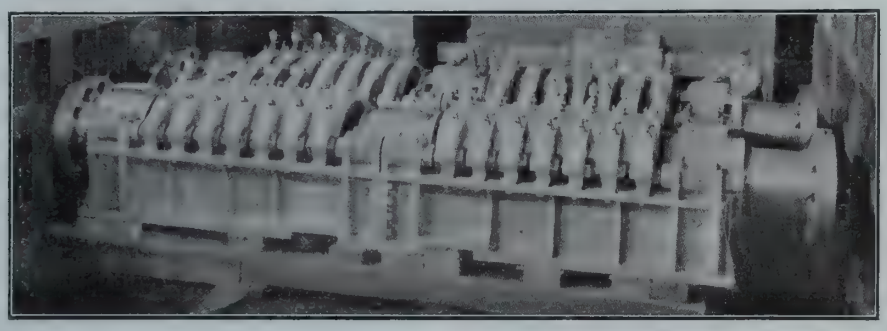
The Reciprocating Engines.

The main reciprocating engines are of the four-cylinder triple-expansion type, balanced on the Yarrow-Schlick-Tweedy system, with the low-pressure cylinders placed at the ends for the purposes of balancing. The diameters of the cylinders are 54 in., 84 in., 97 in., and 97 in., and the stroke 57 in. All the cylinders are fitted with piston-valves, whereas in the Olympic the low-pressure cylinders had flat slide-valves with relief

absolute, instead of 9 lb. under the same conditions.

The high-pressure cylinder has one piston-valve, while there are two on each of the others. The piston-valves are fitted with Lockwood & Carlisle's rings, which are also adopted on all the cylinder pistons excepting that of the high-pressure cylinder, where the ordinary

pressure engines 24½ in. The crank-shaft is in four pieces, and the diameter is 27 in., with a 9-in. hole bored through it. In each engine there are nine bearings, two for each crank-pin, while an additional bearing has been introduced in the centre of the engine. This is in accordance with Messrs. Harland and Wolff's latest practice in large engines,



THRUST BLOCKS OF THE "BRITANNIC."

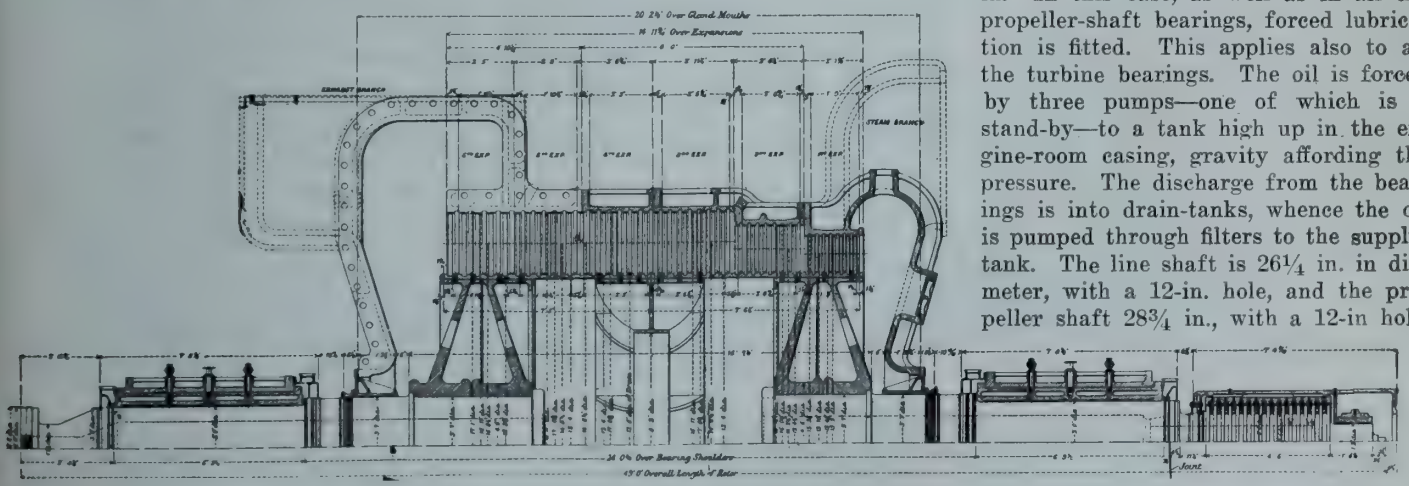
Ramsbottom rings are applied. The valves are operated by Stephenson's link motion.

All the moving parts are of forged steel, but the connecting and piston-rods are of high-tension steel. The diameter of the high-pressure and intermediate-pressure piston-rods is 14 in., and those of the low-pressure cylinders 11¾ in. The connecting-rod has a length 2¼ times the stroke. The body of the high-pressure and intermediate-pressure rod is tapered from 13½ in. in diameter at the top to 15 in. at the bottom; in the case of the low-pressure rods the diameter is 2 in. less. The top end bearings are 16½ in. in diameter and 17¼ in. long, in the case of the high-pressure and intermediate-pressure engines, while

in order further to "steady" the shaft.

The over-all length of the engine is about 63 ft., and the bearings collectively have a length of 26 ft. 6½ in. These bearings have cast-steel bushes lined with white metal, and the shaft is secured by cast-steel keeps. There is water service through the keeps, and in addition to the oil service at the top, there are pipes through the flanges at the ends of the bottom bushes. The oil service is by gravity.

The thrust-shaft is 26 ft. 11 in. long and 27 in. in diameter, with a 9-in. hole. There are fourteen collars, with a central as well as end bearings—a practice generally adopted in large engines by Messrs. Harland and Wolff. The total surface on each thrust-block is 6860 sq. in. In this case, as well as in all the propeller-shaft bearings, forced lubrication is fitted. This applies also to all the turbine bearings. The oil is forced by three pumps—one of which is a stand-by—to a tank high up in the engine-room casing, gravity affording the pressure. The discharge from the bearings is into drain-tanks, whence the oil is pumped through filters to the supply-tank. The line shaft is 26¼ in. in diameter, with a 12-in. hole, and the propeller shaft 28¾ in., with a 12-in hole,



HALF SECTIONAL ELEVATION LOW PRESSURE TURBINE ENGINE, WHITE STAR LINER "BRITANNIC."

rings at the back. This change has been made because of the increase in the pressure in the low-cylinder chest, as it is intended to develop a higher power and to exhaust into the turbine at a slightly increased pressure—about 10 lb.

those of the low-pressure engines are 3 in. less in each case.

The crank-pins in all cases are 27¾ in. in diameter, the length in the case of the high and intermediate-pressure engines being 35 in., and in the low-

reduced at the after end by short lengths of taper to 6 in. There is a portable coupling to enable the propeller-shaft to be withdrawn outboard. The wing propellers have three mangenese-bronze blades on a cast-steel boss, the diameter

being 23 ft. 9 in. The screws are to run at 77 revolutions per minute when the two engines are indicating collectively 32,000 horse-power. These wing propellers are at 41 ft. 6 in. centres, but the reciprocating engines are at only 32 ft. 6 in. centres, the shafts being splayed.

The Exhaust Turbine.

The turbine driving the centre shaft is of the Parsons exhaust type, to take steam from the two reciprocating engines at a pressure of about 10 lb. absolute, exhausting into two condensers at about 28 in. to 28½ in. vacuum, with a 30-in. barometer. This is the largest marine exhaust turbine yet made, the over-all length being about 50 ft. The rotor bladed weighs about 150 tons, while the total weight of the turbine complete is 490 tons. It has been designed to develop about 18,000 shaft horse-power when running at about 170 revolutions per minute.

The rotor-drum is of forged steel, in two pieces in the longitudinal line. These were manufactured by the special spinning process adopted at the Atlas Works, Sheffield, of John Brown & Co. The diameter is 12 ft. 6 in., and the length 14 ft. 11¼ in. The end wheels are of cast steel and were shrunk in and pinned in position in the usual way. A large stiffening wheel has been fitted internally equi-distant from the end wheels. The spindles are 3 ft. in diameter at the bearings and 3 ft. 7 in. in the wheels, but there is a short, quick taper to 21¼ in. where the aft spindle joins the tunnel-shaft. Through them is a 23-in hole, reduced to 11 in. at the tapered part.

Bolted to the rotor-shaft at the forward end is a thrust-shaft with 16 collars, the total thrust surface being 5000 sq in. The turbine casing is of cast iron, and was produced in the foundry at Messrs. Harland and Wolff's works—one of the largest in the country, and now equipped with the important accessory of a well-equipped laboratory. The casing is ribbed both circumferentially and longitudinally. The governor gear can be set to cut off the steam to the turbine by means of a Proell governor should the revolutions exceed by 20 per cent. the normal rate. The hydraulic engine then causes the piston of the change valve to fall, opening the ports to exhaust into the condensers direct. The exhaust pipes from the cylinders to the change valve are fitted with bellows joints having two flattened disks with special steel rings, and with flanges to take the pipes. The conical form of the disks permits movement due to expansion and contraction. Similar joints are fitted to all pipes connected with the condenser, as they insure also air tightness.

The education pipe from the turbine to the condenser is fitted with a large sluice valve, which enables either of the condensers connected to the turbine and both reciprocating engines to be shut off for repairs, the steam passing then to one condenser. The feature of the valve is its enormous size. The total length is 19 ft. 1 in., and the breadth 11 ft. 9½ in. The opening is 8 ft. 6 in. by 10 ft. 6 in., but the clear area is somewhat less than these multiplied together, owing to the stiffening stays and valve supports. The gate is in two parts owing to its great size, and it is opened and closed by hand-gear. On the back of the gate are two racks, into which engage pinions mounted on a cross-shaft having worm-wheels, which in turn engage with the spur-gear that is rotated by hand. The sluice is built up of a cast body formed in sections, the whole being constructed by Messrs. Harland & Wolff themselves. —Courtesy of "Engineering."

WOULD ABOLISH QUEBEC PILOTS.

THAT the Council of the Board of Trade does not intend dropping the question of the abolition of the Corporation of Pilots at Quebec until they have received some definite intimation whether the recommendation of the Royal Commission on this subject will be acted upon in Parliament was evidenced by two letters that were read at a recent regular weekly meeting in Montreal. The first was a letter addressed to the Minister of Marine and Fisheries, as follows:—

"Referring to copy of Bill No. 105, 'An Act to Consolidate and Amend the Canada Shipping Act' which the Deputy Minister of Marine and Fisheries has forwarded with the intimation that your department will be glad to consider any observations or suggestions the council of this board may have to offer with regard to it, I am to say that in view of the statement in your letter of 24th ult. that the abolition of the Corporation of Pilots for and below the harbor of Quebec would be considered in the revision of this Act, and of the fact that the Minister of Marine and Fisheries can have no power in this connection until that corporation has been dissolved, the council is surprised to find that no provision is made in said Act for such abolition.

"As, however, the revision of the Canada Shipping Act will necessarily occupy a very considerable length of time and therefore any improvement in the pilotage system which might yet herein be provided would necessarily be long delayed, the council again urges that special legislation be adopted forthwith providing for the fulfilment of the following recommendations of the Royal Commission on the Pilotage District of Montreal and Quebec, so that before the opening of the forthcoming season of navigation they may have been put into effect; that the Corporation of Pilots for and below the harbor of Quebec should be abolished; and that a superintendent of sea-going experience, who should not be a pilot or an ex-pilot, should be appointed in full charge of the district for and below Quebec."

Want Special Legislation.

The executive council also reported that "in connection with the desired improvement of the pilotage service on the St. Lawrence below Quebec, Pilot J. Eugene Lachance had written the council with regard to the newspaper report that the Shipping Federation was greatly disappointed that the amendment to the Canada Shipping Act does not provide for the abolition of the Quebec Corporation of Pilots. While the council is, of course, not responsible for the opinions of the Shipping Federation, it is in this matter in absolute accord with that organization and it was ordered that Pilot Lachance be replied to as follows:—

"I beg to acknowledge your letter of 26th ult. with reference to a paragraph in the Montreal 'Gazette,' which stated that the Shipping Federation was greatly disappointed that the Consolidated Canada Shipping Act does not contain a provision for the abolition of the Quebec Corporation of Pilots, and I am to say that, while the council would have been glad had that bill provided for such abolition, it would prefer, as being more speedy, that special legislation should be introduced providing for the immediate abolition of that corporation so that the forthcoming season of navigation might open with the pilotage service of the St. Lawrence below Quebec being placed under the direct control of the Minister of Marine and Fisheries, instead of the Quebec Corporation of Pilots, thus placing it on the same satisfactory basis as the service above Quebec.

"That the abolition of the Quebec Corporation of Pilots is a desirable consummation cannot be doubted by anyone in view of the recommendation of the Royal Commission on Pilotage that the corporation be abolished, and of the reasons, so well known to all connected with navigation on the St. Lawrence route, which led the commission to make that recommendation."

R. F. Macfarlane, identified formerly with the Dominion Line and latterly with the White Star-Dominion Line in Montreal, has resigned on the completion of forty years' active service.

CANADA'S ATLANTIC SEABOARD

Shipping and Shipbuilding Enterprises and Industries are Again in the Ascendency in Our Maritime Provinces, and Revival of the Old-Time Activity Appears Imminent

SELF-PROPELLING LIGHTSHIP FOR HALIFAX.

THE contract for the construction, equipment, and delivery of a single screw steam lightship was awarded by the Dominion Government to Bow, McLachlan & Co., Ltd., Paisley, Scotland, in May, 1913. The vessel has now successfully passed her dock and official trials, and her delivery is expected at Halifax, N.S., about the middle of May. Her principal dimensions are as follows:

Length over all	135	ft.	9 ins.
Length on water-line ..	114	ft.	0 ins.
Beam moulded	29	ft.	0 ins.
Depth moulded	14	ft.	8 ins.
Draft	12	ft.	9 ins.
Complement	16	men.	

Construction and Equipment.

The vessel is built of mild steel throughout, is classed 100 A1 at Lloyd's, and is fitted in accordance with the Board of Trade regulations and Government inspection. The stem is of clipper form, and the stern of the elliptical type. Four main transverse watertight bulkheads are fitted, and watertight flats at the bow and stern with the bulkheads adjoining form trimming tanks. The watertight sub-division has been carefully considered, and the vessel has sufficient reserve buoyancy to remain afloat with any two compartments flooded. There are three decks, the main and spar decks being continuous and the lower deck extending from the stem to the coal bunker bulkhead and from the stern to the engine-room bulkhead.

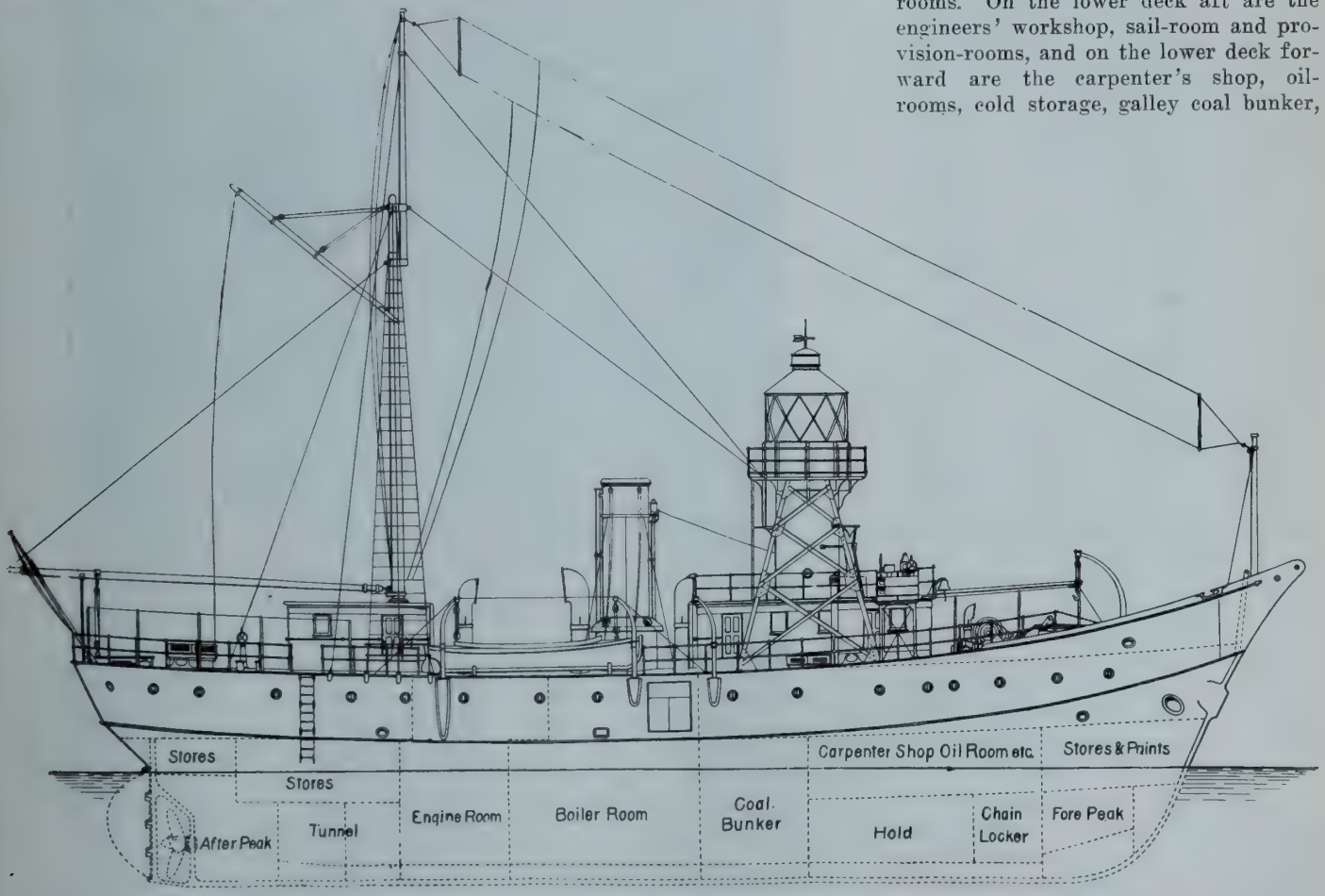
The powerful revolving lantern, which is of the very latest type, and was supplied by Barbier, of Paris, is carried on a heavy steel tower, access to the lantern chamber being had by a stairway inside. The oil for the lantern is controlled by an oil pump situated in the oil-room on the lower deck forward.

The fog horn, which is located on the spar deck just forward of the tower, is supplied from air pressure tanks, which are situated in the forward hold. In the engine-room on the level of the main deck are placed two air compressors supplying the reservoirs. In addition to the fog horn, a large organ whistle is fitted to the funnel.

The deck machinery consists of a large windlass of special design for the handling of the heavy mooring anchors, and a small steam winch on the spar deck for working the boats, etc. There is a complete electric lighting installation aboard the vessel, which includes a steam turbo generating set located in the engine-room. Fresh water, sanitary, fire and steam-heating systems are fitted, and follow the most up-to-date practice. Besides the lantern tower, the vessel has a main mast carrying a main sail and wireless aerials. The boat equipment consists of one 23-ft. lifeboat on the port side and a 24-ft. motor launch on the starboard side.

Accommodation.

Accommodation for captain, officers and engineers is provided aft on the main deck, while forward on the same deck are the crew quarters, including galley, pantry, mess-rooms and store-rooms. On the lower deck aft are the engineers' workshop, sail-room and provision-rooms, and on the lower deck forward are the carpenter's shop, oil-rooms, cold storage, galley coal bunker, and various store-rooms. On the spar deck aft, the wireless cabin and companion to officers' quarters is located, and forward at base of lantern tower is



SELF-PROPELLING LIGHTSHIP FOR HALIFAX, NOVA SCOTIA.

the chart-room and companion to crew quarters. In the hold forward and in the tunnel aft are placed large fresh water tanks of a capacity of 7,000 gallons, while arrangements are also made for catching, storing, and making use of any rain water which may fall on the decks of the vessel.

Propelling Machinery.

The propelling machinery consists of one set of fore-and-aft compound engines, having cylinders 16 and 32 inches diameter by 24 inches stroke, driving a right-hand four-bladed propeller, while the complement of independent auxiliaries is very complete, and includes air, circulating, feed and bilge pumps, general service, fresh water and sanitary pumps, also an evaporating and distilling plant for the supply of fresh water, capable of distilling 2,000 gallons of fresh water per twenty-four hours.

Steam is supplied from two Scotch boilers, 10 feet 6 inches diameter by 10 feet 9 inches long, designed for a working pressure of 120 lbs. per square inch.

ARRIVAL OF CUSTOMS CRUISER "MARGARET."

FRESH from the shipbuilders' hands, the new revenue cutter Margaret, built for the Canadian Customs service, has arrived at Halifax, after a trying voyage from Southampton. The Margaret was greatly delayed in her passage by heavy head gales, and off Sable Island sent a call to Halifax for bunker coal. The Government steamer Montmagny was despatched to her assistance, and, despite rough weather, transferred 20 tons of coal to the cutter, thus enabling her to complete her voyage to Halifax. At the same time the Margaret was supplied with a quantity of provisions, as her stock of fresh meat, flour and biscuits had run low.

The two ships set out for Halifax, but on account of the heavy weather the Margaret again ran short of coal before she was finally able to make the anchorage off the dockyard.

The Margaret was in command of Captain O'Neil, R.N.R., and his crew were on the payroll of the builders, Captain May and a Canadian crew now at Halifax will take over the ship within a few days. The Margaret will be engaged in the Customs service in the St. Lawrence River and Gulf.

Notes of the Voyage.

The new ship sailed from Southampton on March 25, and it was expected that she would make the passage to Halifax in ten or twelve days, instead of which she took nineteen days. In midocean she encountered a very severe gale and for days was practically hove-to, covering only 75 miles in that time. Nearing Sable Island her coal and provisions ran out and she sent a call to Halifax for assistance.

On Saturday, April 11, the Montmagny, Capt. Pouliot, sailed from the dockyard, and at ten o'clock that night she was informed of the Margaret's position. At 3.30 a.m. Sunday the Montmagny sighted the Margaret's powerful searchlight, and by four o'clock had come within hailing distance of the distressed ship. In a very short space of time a boat laden with coal, had been lowered from the Montmagny and was on its way to the Margaret. This service continued for four hours, by which time the Margaret had secured 20 tons of coal and some provisions, and was able to proceed.

Memorial to "Titanic" Engineers.—The unveiling on April 22, at Southampton, England, of a memorial to the engineers of the Titanic was witnessed by 10,000 people. The ceremony was performed by Sir Archibald Denny, the Dumbarton shipbuilder. The memorial is a granite monument surmounted by a bronze angel bearing a laurel wreath.

Watch Fobs for Brave Sailors.—The captains and men of the Bay of Fundy steamers Westport and John L. Cann received on April 24 from the British and Foreign Sailors' Society, through Rev. Alfred Hall, of Toronto, watch fobs made of copper from Nelson's "Victory" in recognition of bravery in the Cobequid rescue.

CAPTAIN FRANCIS D. INCH, THE HERO OF THE "VOLTURNO" DISASTER IN MID-ATLANTIC, OCTOBER 10, 1913.

GREAT LAKES AND ST. LAWRENCE

Water Transportation From the Atlantic to the Heart of Canada is one of the Live Issues of our Time and is Daily Becoming of Increased Importance

CANADIAN VICKERS, LTD., MONTREAL.

THOSE who have seen the active preparations now going on at the Maisonneuve plant of the Canadian Vickers, Ltd., for the construction of the ice-breaker which the Dominion Government has ordered, and where incidentally five million dollars have been invested for the purpose of promoting steel shipbuilding in Montreal, are somewhat perplexed at the recent Toronto criticism of a university professor, who declared that the Department had given the order for an ice-breaker to a firm that had never built such a craft before. It is held that Hon. J. D. Hazen and his trained officials must have known what they were about when this order was forthcoming, for it not only foreshadowed the encouragement of a very important industry, but something that will be a boon to the city of Montreal and to the Dominion generally.

The firm of Vickers, Ltd., who have built some fifty battleships on the other side of the water, will certainly be able to carry out the designs prepared by the Department's naval architect, Mr. Charles Duguid, and build what is intended to be one of the most modern ice-breakers in the world. They built the Lady Grey in the Old Country, and it was by experience gained on the St. Lawrence with that ice-breaker that plans have been prepared, all of which are ready except certain unimportant details for the vessel which is to be commenced at the Canadian Vickers, Ltd., yard early in June, and be completed and ready for the winter service of 1915-16, at a cost of nearly a round million dollars.

It is understood that the new ship will be used between Three Rivers and Quebec, thus preventing the annual jam of ice at Cap Rouge and vicinity. The chief engineer of the ship channel has given a great deal of study to the condition of the ice between Montreal and Quebec, and his advice being so valuable, it can scarcely be conceived how any mistake can be made as to the policy of the Government in the matter of early spring navigation or as to the means adopted in bringing this about.

Work All Year Round.

In the first place, the company's new offices have just been completed a little west of where the C.N.R. crosses Notre Dame Street, the same overlooking the several buildings constituting the general plant. The machinery of this their first boat will have to be brought out from England, as their engine and boiler works will not be completed in time, but as soon as the site is leveled off on the north side of the drydock basin, the proposed works will be rushed forward to completion, so that the boilers and engines of any future ship can be made at the plant in Maisonneuve.

The basin just mentioned is a thousand feet long and five hundred feet wide, with fifty feet depth of water at all times, and the ice-breaker, which is to be built at the west end of the basin, will be launched and fitted out alongside the wharf. A shed is being constructed so that work will be carried on quite as rapidly in winter as in summer. Everything that can be procured or produced will be purchased or manufactured in Canada, and by mid-summer some five hundred skilled workmen will be engaged on the construction of the first ice-breaker built in this country.

ONTARIO'S OCEAN PORT.

ANY suspicion that Moose Harbor, on James Bay, could not become a great seaport was dispelled by Mr. J. G. G. Kerry, consulting engineer of the T. & N. O. Railway, in an interesting and illuminating address at the Science Building, Toronto, on March 26. Mr. Kerry submitted a number of facts concerning the position and nature of this harbor, to which the Government Railway is to be extended.

Need of Northern Development.

"Information as to the design of a great terminal is not complete, and much has yet to be secured before the design can be worked out without alteration." Mr. Kerry took the view that New Ontario, an unsettled district between two more settled portions of the Dominion, was the cause of a distinct east and a distinct west.

"The settlement and development of this portion is the most important national work now in progress in Canada," said the speaker. "The establishment of a commercial centre will assist greatly in the development. Moose Harbor is well located." Mr. Kerry pointed out its proximity to Toronto, Winnipeg, Montreal, and other large centres, adding that it was but twenty-four hours' run from Toronto.

Easy to Make a Harbor.

Referring particularly to Moose Harbor, the speaker said that the tides did not appreciably affect it, and that the average low tide depth was from 15 to 20 feet.

"The most serious proposition is the bar at the river mouth," continued Mr. Kerry. "My personal opinion is that if a channel be dredged it will be found that it will remain open. There is not sufficient silt in the river discharge to fill it in. It is not wise to look for an enormous growth in traffic at first, and a depth of 15 feet in the channel over the bar at low tide will be sufficient now, and more can be done as the traffic grows."

Season of Fair Length.

The length of the navigation season at Moose Harbor was only one month shorter than the season in Montreal, and ran from five and a half to six months, and this could be lengthened by the use of icebreakers. The Moose River went out with tremendous ice crushes in the spring, but these, under conditions very similar, have been mastered in Montreal and could be there.

Mr. Kerry estimated that 1,000 feet of crib wharf could be put in at a cost of from $125,000 to $150,000, and that a 15-foot depth channel could be dredged through the bar for from $500,000 to $600,000, making a harbor to start with, to be enlarged if traffic demanded.

GEORGIAN BAY CANAL COMMISSION WORK.

THE character of the inquiry respecting the Georgian Bay Canal is set forth in an Order-in-Council made public on March 28, following a conference between Mr. Sanford Evans, of Winnipeg, and Col. F. H. Meighen, of Montreal, with Hon. Robert Rogers. Commissioner Edouard Gohier, of Montreal, is in Europe, but is returning shortly, when regular meetings will be held, and the inquiry proceeded with. Mr. J. D. Hepburn, who for many years has been connected with lake transportation, is secretary of the commission, and will start at once to collect preliminary data. The inquiry will cover the following points:

Scope of the Inquiry.

(1)—A study of the transportation problem in relation to the proposed waterway.

(2)—The advantages of a large waterway from the lakes to the seaboard open to the largest type of lake carriers; the feasibility of these carriers navigating such waterway, and the influence on the rate regulation of transport.

(3)—Competition of the waterway with the railways; effect on railways by creating new industries on account of cheap transport of low-grade freight that cannot be handled by rail.

(4)—The probable volume of traffic available on account of the natural advantages of such waterway.

(5)—Causes for diversion of Canadian traffic to United States ports.

(6)—Lake rates and a general comparison with railway rates and relative volumes of traffic.

(7)—The position of the North-West, and how the situation at the head of the lakes would be ameliorated.

(8)—The position of the existing and projected gulf lines via Galveston; what their influence would be with regard to the diversion of traffic from the lakes and St. Lawrence route; the effect upon the movement of the traffic by the opening of the Hudson Bay and Pacific and Panama routes.

(9)—Conditions on the Atlantic seaboard as to handling traffic and as to ocean and insurance rates.

(10)—Interprovincial trade and facilitation of exchange of eastern and western products owing to lower rates.

(11)—The canal as a factor in developing the iron and pulp industries and other resources.

(12)—The development of water powers along the route and the tendency to manufacture at the base of supply.

(13)—New territory which may be opened in the North-West and cost of transportation of wheat to the head of the lakes.

(14)—Storage at lake and seaboard terminals.

(15)—Markets, statistics, history of canals and their development.

(16)—Generally speaking, the commercial feasibility of the proposed waterway.

A WASTE OF MONEY.

"IT would be an absolute waste of money to deepen the St. Lawrence River just because the Welland Canal is being deepened," said Sir Robert Perks, the English engineer and builder of public works, who arrived in Montreal from New York, a few weeks ago, in the course of a conversation on Canada's waterway requirements.

Sir Robert said he still favored the Georgian Bay-St. Lawrence Canal scheme. He said that the Welland Canal-St. Lawrence route would cost more than double that of the Georgian Bay route; it would be much longer, while it would not be wholly under the control of the Dominion.

The Welland Canal - St. Lawrence route would cost $280,000,000, Sir Robert claimed. He further said the cost of deepening the St. Lawrence River so that ocean-going steamers could use it would be as much as the whole Georgian Bay Canal scheme, while permission to do it would have to be secured from the United States. He thought the Georgian Bay Canal and the English Channel tunnel were the two great outstanding engineering tasks that should be undertaken in the near future.

PLANNING SEASON'S WORK ON MONTREAL HARBOR.

PRELIMINARY operations in the harbor improvements to be carried out this season by the Montreal Harbor Commissioners have just been commenced and within the next three weeks, it is expected the full programme of work, involving an expenditure of approximately $3,000,000, will be under way. The work will be a continuation of the improvements that have already been started and will include the completion of the 20 foot channel to divert part of the St. Mary's current, by means of which better conditions will be secured in the harbor.

While the Government has not yet made a grant for the year, it is anticipated that about $3,000,000 will be given to the Harbor Commission, and improvements necessitating the expenditure of that amount are planned. Most of the work was started either last year or the year previous, when practically the same amount was spent, but should the grant prove smaller this year, some of the improvements planned will have to be postponed.

The electrification of the high level railway may be commenced and the railway extended about a mile to the Vulcan works, or even four miles to Pointe aux Trembles. At that point the construction of a wharf for the Canada Cement Co. will be started in a few weeks, this being the furthest east point.

At the dry dock site, dredging will be continued and the quay walls raised for a distance of from 600 to 800 feet. In connection with the extension of the high level railway, several bridges will be constructed, notably one at Aylwin street. Two sheds, which are already in course of construction, will be completed, and the foundations of a third laid, thus providing more accommodation for vessels. No. 1 elevator extension will be finished and a large amount of paving on the wharves carried out. Altogether about 2,000 feet of wharf will be paved.

Extend Market Basin.

A new wharf is to be built at Longueuil for the Armstrong Whitworth Co. and this will probably be done during this season, while, on the Montreal side, the Market Basin will be extended and work carried out on the new Victoria Pier, which is already more than half finished. The old pier, part of which remains, will be removed. Throughout the harbor and ship channel, dredging will be continued. In this connection it may be noted that although the harbor is under the jurisdiction of the Commissioners, the ship channel which runs through it is dredged by the Government. However, as soon as the Commissioners have dredges to spare they will be detailed to assist on this work.

One of the most important of the harbor works is the dredging of a channel 20 feet deep, from a point at the outer side of the St. Mary's current and opposite Richelieu avenue to a point opposite the King Edward pier, the channel running on the south side of Ile Ronde and St. Helen's Island. The object of this channel is to decrease the flow of water outside the islands, thus diminishing the current in the harbor and making it safer for ships. The channel has already been completed from the south end to a point about half way up St. Helen's island and a noticeable improvement has resulted. During the summer months dredging will be continued at the point where it was left off last year and also started at the upper end of the channel so that the dredges will work both ways. It is expected to complete this work by the close of the season.

QUEBEC PILOTS' CORPORATION.

THE Hon. J. D. Hazen has given notice of a Bill respecting the Quebec Pilots' Corporation. The original intention was to deal with it in the revision of the Merchants' Shipping Act, but this will not be done. Instead there will be special legislation on the subject put through in time to be effective in the season of navigation soon to open.

It will be recalled that the Pilotage Commission, after an inquiry recommended the abolition of the Pilots' Corporation, and made certain other suggestions. The most of the latter have been implemented, and the Montreal Board of Trade has been urging that the recommendations respecting the Pilots' Corporation be carried out without delay.

It is understood that in the Bill being brought down by the Minister the Pilots' Corporation at Quebec will not be abolished outright, but the Minister will vest in himself full power to direct and manage the pilotage service in that district.

PACIFIC COAST DEVELOPMENTS

Featuring the Record of Progress and Dealing With the Steps Being Taken to Stimulate and Enlarge the Already Established Shipping and Shipbuilding Enterprises

TO BE "PRINCESS IRENE."

PRINCESS IRENE will be the name of the sister ship of the Princess Margaret. Announcement was made recently at the offices of the B.C. Coast Service that the company had decided to change the original selection of Princess Melita to that of Princess Irene.

The names of the two new passenger steamers now under construction at the Dumbarton yards of Messrs. Denny Bros., were announced in our March issue, but owing to objections raised by the British Board of Trade, with reference to the name of Princess Melita, the company heads immediately cast about for a new title, with the result that the more appropriate name of Princess Irene was selected and approved of by Sir Thomas Shaughnessy, C.P.R. president.

Ships Well Advanced.

Satisfactory progress is being made with the construction of the Princess Margaret and Princess Irene, but the date has yet to be set for the launching. The shell plating is well advanced, and it is expected that the first vessel will be launched in July. The work of building the propelling machinery is going on simultaneously with the construction of the hulls, so that little time will be wasted in fitting out the vessels after they are launched. They are to be delivered by the end of the present year for the early spring trade in 1915.

These geared-turbine vessels will be the fastest ships afloat on the Pacific coast. They will average over 23 knots, and will in every way eclipse anything afloat on this side of the Pacific. The two new Princesses will each be of 5,000 tons register, and will be capable of carrying twice as many passengers as the largest of the steamers now plying on the triangular route.

DOLLAR CO. ORDER NEW VESSEL.

HAROLD DOLLAR will be the name of the new steamer which the Robert Dollar Steamship Co., of San Francisco, has made arrangements to build on the Clyde for service in the lumber carrying trade from ports on the Northern Pacific Coast. She will be larger than the Robert Dollar, at present the largest of the fleet, and will have capacity for handling more than 5,000,000 feet of lumber. The fleet of the Dollar Line is at present composed of the steamships Robert Dollar, Bessie Dollar, M. S. Dollar, Stanley Dollar, Melville Dollar, Hazel Dollar, Grace Dollar and Mackinaw.

It is the intention of the owners to use several of these steamers in transporting the greater part of 24,000,000 feet of lumber from Victoria and Vancouver Island for use in the construction of the Toronto Harbor Works, and the first of these consignments will go via the Panama Canal immediately the great waterway is thrown open to ocean traffic. The steamers of the Robert Dollar Line are operated principally in the lumber carrying trade, and the more modern of the fleet are especially equipped for this purpose.

Flagship of Fleet.

Upon completion of the Harold Dollar, she will be the flagship of the fleet, and Captain Robert Dollar says she will cost about $280,000. If built at San Francisco or other American yards, he declared that the vessel would cost over $600,000. The vast difference in favor of the builders in Scotland or England he holds to be attributable mostly to the higher wages paid mechanics on this continent.

The Harold Dollar will be operated under British registry, with Victoria as her home port, as is the case with other vessels of the fleet. Formerly the company owned a coaster known as the Harold Dollar, but over a year ago she was sold and the name changed to Greywood.

VANCOUVER FIRM SECURE WHARF CONTRACT.

MARKS, TUPPER & KIRKPATRICK of Vancouver have been awarded the contract for the construction of the Marine Wharf on the site of the proposed Marine and Fisheries Depot on the Songhees Reserve. They were the lowest of several tenderers, they having undertaken to carry out the work for the sum of $20,450. The contract calls for the erection of a creosoted concrete pile wharf, approximately 640 feet long, and the grading of 27,000 feet of material to the level of the wharf. At the site all is now in readiness for an immediate start on the contract, and as soon as the necessary contracting outfit can be assembled, the erection of the wharf will be proceeded with.

The specifications show an L-shaped wharf, which will be located to the immediate north of the existing E. and N. bridge on the Songhees Reserve. Since December last the Dominion bucket dredge Mudlark has been engaged dredging out material from the site of the wharf in order to give a sufficient and uniform depth in which to berth the Government vessels after the completed wharf has been turned over by the contractors.

LIGHTHOUSE TENDER "ESTEVAN"

WHEN the big lighthouse tender Estevan, Captain Barnes, is again placed in commission she will have an unusually heavy season's work ahead of her. The vessel has been undergoing her annual overhaul at the Esquimalt yards of Yarrows, Ltd., and will resume service this month. As a protection against the heavy buoys and other cumbersome aids to navigation which are slung aboard the tender from time to time, the whole of her forward deck has been sheathed in fir, and numerous other minor additions and improvements have been carried out since laying up. The first trip to the North will be a short one, being under orders to proceed as far north as Texada Island to place a gas buoy in position at Rebecca Point.

After this short cruise, the Estevan will take aboard supplies for all the principal lighthouses between Victoria and the northwest coast of the Queen Charlotte Islands. This cruise will take about three months to complete. While in the North the Estevan will also carry out extensive buoy work.

The lighthouse tender Quadra, Captain Le Blanc, will be given her annual overhaul shortly, in order that she be in the best of trim for the summer season.

The first big undertaking to be started this spring will be the erection of a first-order lighthouse at Bonila Island, Hecate Strait. This lighthouse, which will be of similar design to the one at Langara Island, will be completed and in operation by the fall. April 15 was the approximate date set for the placing in operation of the Addenbroke Island light.

Captain W. W. Stewart, aged 67, died suddenly at St. Clair, Mich., on April 8. He was born on Harson's Island, in the St. Clair River. The late Captain Stewart was a skipper on the first ferry line operating between Sarnia and Port Huron.

Canada's Transportation Problem and Montreal Harbor

By F. W. Cowie, B.A.Sc., M. Inst. C.E.

Being an abstract of a paper read before the Institution of Civil Engineers, London, England, on April 7. The author, as will perhaps be generally noted, is Chief Engineer to the Montreal Harbor Commission, in which capacity he has borne a prominent part in the development of the St. Lawrence waterway and its metripolitan terminal.

THE population of the Dominion of Canada is about 8,000,000, and the foreign trade per capita is $125.

The population of Montreal, including the connecting municipalities, is about 600,000, and the foreign trade of Montreal per inhabitant is over $600. As a comparison, "England (United Kingdom) has a foreign trade per capita of $125, Germany $67, and the United States $41."

The total land area of Canada is 3,600,000 square miles, so that the density of population is less than two per square mile, as compared, for instance, with thirty-one per square mile in the United States.

It has been stated by trade experts that the difference between the average price received by the producer of Western Canada and the price paid by the consumer of the food products is 33 per cent. For wheat for which the consumer pays $1, the farmer, therefore, receives 67 cents; 33 cents being paid for transportation and handling, and to the selling organizations. It is equally vital, therefore, to the producers in Western Canada and to the consumers in Great Britain, that this latter percentage should be reduced to the lowest possible figure, so that the farmer may receive the full due for his toil, and the cost of living in Great Britain may not be unduly enhanced.

Another consideration which is of vital interest to Canada is the absolute necessity of collecting by her own people the transportation and selling tolls, and as an illustration, it may be stated that, although in Montreal harbor 60,000,000 bushels of grain were handled in 1913, nearly 100,000,000 bushels of Canadian grain were shipped in the same year through Buffalo in the United States.

The cost of transportation per bushel, from the average point of divergence to the United Kingdom, may be stated, for the various stages, as approximately 18 cents, and for every bushel of grain shipped through Buffalo there is, therefore, a loss to Canadian transportation and selling organizations of about 18 cents, or for 100,000,000 bushels $18,000,000.

Transportation in Canada.

Even with these striking illustrations, it is not easy to fully appreciate what is known in Canada as the "problem of transportation." A comprehensive view of the Dominion and the North Atlantic to Europe was shown by an original map drawn to scale (Mercator's Projection). This indicated Canada and the northern half of the United States with the trade routes to Europe. The main routes are naturally "east and west," and the vast area tributary to the River St. Lawrence was geographically shown.

The "north and south" routes through the United States are principally by rail or by the Erie Canal from Buffalo to American Atlantic ports. The Erie

F. W. COWIE.

Canal was created by the United States to offset the advantages of the St. Lawrence route. The magnificent railway systems between New York and Buffalo are the most powerful rivals of the "all Canadian" routes.

The opening up of the vast productive areas of Western Canada, where it has been found that with one-tenth of the cultivable land under crop, 200,000,000 bushels of wheat and double that quantity of other grains may be grown, has established, within the last few years, entirely new transportation conditions. With the tremendous tide of emigration from both Europe and the United States to the new provinces, this production will necessarily increase greatly, and the problem is, how to provide the required transportation facilities. A table of transportation routes from the Canadian West to the United Kingdom was given. This interesting table is worthy of study, as not only present routes are shown, but important projected and commenced lines of trade are indicated.

Great efforts are being put forth by the Canadian Government and the transportation and other corporations to improve facilities, so as to cheapen and render available Canadian routes; but at the same time similar and extraordinary efforts are being made to improve Buffalo harbor, the Erie Canal, the rail routes, and the harbors of Boston and New York. In the opinion of the author, who advanced striking illustrations and argument, with equal effort, the advantages for future transportation should lie with the St. Lawrence route.

Montreal's Position.

The transportation routes in Canada almost all lead to Montreal, and up to the present the only real rival to the Montreal-St. Lawrence route is the United States route via Buffalo and New York. The western trunk lines of the United States have been improving their "north and south" connections so as to tap the three great western provinces of Canada. These railways provide excellent services to Duluth and Chicago.

A further diversion is made to the United States route at Port Arthur and Fort William. From this twin port at the head of the Great Lakes, the cheapest commercial navigation in the world enables grain and other products to be shipped to Buffalo. Between Buffalo and New York there are several splendid railway systems and the Erie Canal. The new Erie Canal, a modern barge-canal through the State of New York, giving a draught of 12 feet, will soon be completed at a cost, including harbors and damages, which is expected to reach $150,000,000. The New York and Boston port authorities are at the same time making every effort to improve their harbors, and to provide such attractive facilities as will capture at least a large share of this growing Canadian trade.

By the Canadian routes everything goes by rail direct from the West to Port Arthur. From the twin cities, Port Arthur and Fort William, there are, with modifications, two distinct routes;

namely, the "All-Water" route, direct to Montreal, and the "Lake and Rail" route, through Georgian Bay to Montreal. By the "All-Water" route to Montreal, a distance of about 1,400 miles, vessels are limited by the present Welland and St. Lawrence Canals to a draught of 14 feet, or 2,500 tons. An excellent type of vessel has been developed for this service, and the trip from Montreal to Port Arthur and back is made in fourteen days.

By the "Lake and Rail" route, vessels of 10.000 tons ply between Port Arthur and ports on the Georgian Bay. The Canadian railway companies have established magnificent elevators at Port Arthur and Fort William, and also at several Georgian Bay ports, so that loading and discharging may be carried on with unsurpassed facilities. From the Georgian Bay ports, splendid railways are being built to Montreal, and existing lines are being improved.

Montreal's Facilities.

At Montreal harbor, the St. Lawrence Canal system and all the great Canadian transcontinental lines centralize. The great Canadian railways—the Canadian Pacific, the Grand Trunk, the Grand Trunk Pacific and the Canadian Northern—are all feverishly improving their terminals at Port Arthur and Fort William, at Georgian Bay ports, and at Montreal. The Canadian Government has commenced the construction of the new Welland Ship-Canal between Lakes Ontario and Erie. This canal, with 800-foot locks and with a possible ultimate draught of 30 to 35 feet, will accommodate the large lake carriers so as to continue to Kingston or Prescott without breaking bulk. This will add greatly to the shipping in Montreal, and will, it is confidently expected, hold the greater part of the Canadian trade to the St. Lawrence route. Montreal, however, under existing conditions of traffic and accommodation, is almost at the limit of its capacity. With double the present traffic assured within the next few years, it will require a great deal more and better harbor accommodation to meet the demands upon it.

Montreal to the Sea.

With the possible exception of the development of Glasgow, there is no more romantic episode in the annals of harbor-engineering than the making of Montreal an ocean port. Largely by the faith and energy of Scotch-Canadians, following the successful improvements on the Clyde, the River St. Lawrence between Montreal and the sea has been deepened from less than 10 feet to its present depth of 30 feet at the low stages of the river-level. During the early summer months the depth is greater, and reaches as much as 38 feet. The minimum width is 450 feet.

Although the author is not now connected with the staff of the River St. Lawrence Ship-Channel, he was continuously engaged upon that great work for twenty-two years, commencing as an assistant and being in charge as superintending engineer for ten years up to 1909. For many years this has been looked upon as being one of the great successful public works of Canada, and under the Hon. J. D. Hazen, Minister of Marine, the work is now in charge of Mr. V. W. Forneret, B.A.Sc., superintending engineer, who for many years was the author's chief assistant. The work is all carried on departmentally. The plant is owned by the Government, and for its own special work comprises probably the most complete dredging-plant and excavating machinery for submarine rock in existence at the present time.

At the present time, with magnificent range lights for each course, with a splendid system of gas-buoys and a telephone signal service, navigation is considered very easy and safe by night as well as by day. The deepening of the channel from 30 to 35 feet at extreme low water was commenced two years ago, and about one-fifth of the work to tidal water is already completed.

The natural fall in the river-level between Montreal and Quebec, a distance of 160 English miles, is 29 feet. The maximum discharge of the river during the season of navigation is about 600,000 cubic feet per second, while, at the lowest stages of water, the minimum is slightly less than 200,000 cubic feet per second. With the present average slope and velocity of current and average cross section, the low-water river-level and discharge are balanced, with an average current of about 3 miles per hour. This being theoretically correct, it may be considered assured, that if the water-supply of the St. Lawrence remains unchanged and the natural cross section of the river is not enlarged, the present river-levels will be constant. The permanence of the ship-channel and the St. Lawrence route would therefore appear to be well assured.

From Montreal via the St. Lawrence to the open sea the distance is nearly 1,000 miles, and, besides the attraction to passengers of three days' sailing in smooth water with beautiful scenery, the strong commercial consideration for water freights into the interior is the incentive to keep pace with increasing trade on the North Atlantic. During the season of seven months the commerce passing through Montreal is nearly 40 per cent. of the total commerce of Canada, and this percentage is increasing. In 30 years, only two ships have been totally lost between Quebec and Montreal, and the occasional groundings, which are well advertised, are not frequent. None of the accidents whatever in recent years has been due in any measure to the ship-channel.

Montreal Harbor.

In 1830 the first harbor commission was appointed under the authority of the Governor of the Province of Canada, for the purpose of carrying into effect "An Act to provide for the improvement and enlargement of the harbor of Montreal."

In their first annual report, the commissioners recorded that they confidently anticipated that the wharves undertaken would be, when completed, superior to any works of the kind in the province, and would enable the city of Montreal to be advantageously contrasted with any other in North America for beauty, solidity, and convenience of approach by water. This was the first attempt made to improve the harbor of Montreal by a commission. The commissioners had the same faith in the future of the harbor, and courage in undertaking works, which has characterized the administration from 1830 to the present time. The present harbor of Montreal justifies the modest boast of the commissioners of 80 years ago.

Scheme of Harbor Extensions of 1910.

In 1910, the author prepared for the harbor commissioners a comprehensive scheme of improvements, according to which it was proposed to develop the valuable water-front and shores of the river, owned exclusively by the Dominion Government and held in trust by the harbor commissioners, so as to result in the following revenue - producing features:—

(a)—Sites for industries, by making land and improving connections with inaccessible properties.

(b)—The extension, enlargement and improvement of railway-termini, giving equal facilities to all Canadian lines for connecting with harbor and industrial points.

(c)—Facilities for encouraging and developing industries along the valuable water-front. According to the board of consultative engineers, the items approved were estimated to cost $17,000,000, and this work is now in progress.

The winter condition is a surprise to those who are accustomed to ports open all the year round, but as the Great Lakes and their navigation, amounting to 75,000,000 tons annually, and their great ports are also all closed at the same time, and by the same cause, Montreal harbor does not suffer unduly. The shipping of the St. Lawrence in the

autumn is at once transferred to the excellent Canadian ports of Halifax and St. John, and commerce is carried on all the winter as usual with only the disadvantage of the extra rail haulage.

A very full description was given of the physical features of the River St. Lawrence and Montreal harbor. Construction conditions and types of construction were described and illustrated, and show that although the cost of labor is very high in Canada, this is counterbalanced to a large extent by the use of machinery. The original "make shifts" for harbor-construction are now being followed by modern design. The use of timber and concrete, and the designs to overcome the danger and damage from frost action were described fully.

Floating Dock, Shipbuilding and Repairing Yard.

For many years the harbor commissioners of Montreal, urged on by the shipping and business interests, had endeavored at various times to solve the problem of the establishment of a dry dock in Montreal harbor. Negotiations in 1909 with a shipbuilding firm and the final incorporation of the Canadian Vickers, Limited, solved the problem. The harbor commissioners agreed to furnish the site, situated on harbor property, in such a position that nothing would be done to hamper future extension of the harbor. The commissioners undertook to dredge the deep basin and to furnish a site of 30 acres of made land. The rental from the land and the increase in harbor-traffic is expected to pay the harbor commissioners the interest on the outlay. As a result Montreal harbor has now a floating dock, the "Duke of Connaught," capable of docking the largest vessel trading to the St. Lawrence, at practically no burden on the harbor finances, and there are being established naval construction works capable, in a year or two, of building, in Canada, any vessel from a Dreadnought to a full-sized merchant ship.

This dock was constructed complete at Barrow-in-Furness, and towed across the Atlantic by two powerful tugs, reaching Montreal on 18th November, 1912. The length of the dock over platform is 600 feet, the width over all 135 feet, and the lifting capacity 25,000 tons. On the 18th November, 1912, H.R.H. the Duke of Connaught, Governor-General of Canada, formally dedicated the new floating dock to the service of commerce and shipping.

Storage and Handling of Grain.

As grain shipments in Montreal harbor constitute about one-fifth of the total annual freight handled, and as every effort is being made to meet competition so that the greater part of the Canadian grain exported shall be shipped through Canadian ports, special attention was given in the paper to the facilities for the storage and handling of grain. It is acknowledged that the Montreal equipment is the latest and most successful, as compared with the facilities for the storage and handling of grain at any of the great ocean ports of the world.

As the most characteristic unit of this plant has just been completed, the author, who has had to do not only with designing but also with operating, gave a detailed description of the grain-handling trade, as well as of the design and construction of the plant in Montreal harbor. There is probably no lesson in port-management to be learned that will better illustrate how failure may be turned into success by arranging varied operations under one management and yet so centralized as to cover every requirement of a special trade without disturbing other departments of port business.

Elevator No. 1 was constructed in 1904. It was of the latest design and was placed in the most valuable site on the harbor. It could receive grain by railway wagons or by lake vessels at the rate of 16,000 bushels (400 tons) per hour. Ocean steamships, by moving to the elevator berth, could be loaded at double that rate. The ocean vessels, however, declined to move to the grain berth to receive grain. It involved tug service, pilotage, etc., and interrupted other operations of loading and unloading, and they desired to ship grain at certain and convenient periods of unloading and loading. Tramp vessels were satisfied, but the proportion of tramps was small. In 1907 the working of this elevator devolved upon the author. The capital cost then amounted to about $1,000,000, the interest account to over $25,000, the operating and maintenance charges to an equal sum. The total revenue for 1907 was about $8,000, and the loss was over $40,000.

The system can store 3,600,000 bushels of grain, can receive about 800,000 bushels (20,000 tons) per day, and can deliver an equal quantity to any of fifteen ocean steamships at their regular berths, and to nine vessels at one time. With it, and with a fleet of six floating elevators for direct transfer, the harbor commissioners received, stored and delivered in 1913 nearly 44,000,000 bushels. The capital expenditure had now reached $4,500,000, but during this season, the first covering the operation of the complete installation, the system paid interest, maintenance, operation and depreciation.

Purpose of the Development.

This very complete and costly installation is the result of competition. Its purpose is to keep the trade in Canadian channels, and reduce the cost of transportation. While the Canadian Government and the harbor commissioners of Montreal are encouraging and cheapening transportation, there are those who, rightly or wrongly, are of opinion that improvements for the storage and handling of grain in the ports of the United Kingdom are not advancing in equal measure, so as to result in lower cost to the consumer and better encouragement to the producer.

The importation of grain is one of the largest items of shipping at several of the ports of the United Kingdom. The facilities for the economical handling of grain, and the cheap forwarding of it to the manufacturing mills are, however, far behand the modern successful American and Canadian practice, and even of the growing competitive North Sea ports. There is also a decided lack of such storage facilities as would guarantee food-supply, and at the same time regulate shipments and, consequently, prices. In several of the magnificent new dock schemes, where such methods could be installed to apparent advantage, these features, which have been so successful in reducing costs in Canada, are apparently overlooked, although it is felt that, for so extensive a trade, they should receive exceptional attention. Otherwise further encouragement will be given to the United States millers to manufacture Canadian wheat, and ship the flour in convenient packages direct to the bakers, resulting in loss not only to Canadian transportation systems but also to British manufacturers, and further curtailment of the home food-supply, to which public attention has been drawn.

The questions of storage and ventilation, and also the cost of modern elevators were dealt with, and the remarkable reduction in insurance rates in modern elevators also referred to.

The floating pneumatic elevator, discharging on to conveyer-belts in culverts leading to a central storage elevator, should be practicable at most of the new British docks. Construction work, labor, machinery, and power being cheaper

F. W. COWIE HONORED.

The Council of the Institute of Civil Engineers, London, England, have awarded to Frederick W. Cowie, chief engineer of the Montreal Harbor Board, the Telford Gold Medal for his paper on "Transportation Problems in Canada and the Montreal Harbor." This annual gold medal is a coveted prize given to the members of the Institute for papers on engineering subjects.

than in Canada, the tariff charges, allowing for profit, should not be higher than in Montreal for a similar operation. The cost of insurance on grain in modern elevators is exceedingly low; the rate on grain in the Montreal harbor elevators is 20 cents per annum per $100, as compared with $3.20 per $100 in wooden elevators. With such storage facilities owners could store in large quantities and hold for favorable markets, and the economic results on even a portion of the total imports into the United Kingdom, amounting to about 500,000,000 bushels per annum, would pay in a year for probably one such installation.

Cost of Elevator.

The cost of modern elevators has ranged from 40 cents to $1.00 per bushel of capacity, so that a million-bushel house costs from $400,000 to $1,000,000. The harbor commissioners' system, with a storage capacity of 5,000,000 bushels, and with its extensive conveyer system providing galleries to nineteen berths, will cost about $5,000,000, or $1.00 per bushel. Elevators of similar type and working capacity can be built without the conveyer facilities for about 60 to 70 cents per bushel.

A detailed description of the construction of the latest elevator was given in an appendix, while of importance to engineers, architects and builders was a section of the paper on vibration tests of reinforced concrete. Considering the experiments as a whole, it would appear that the effect of the vibration was to increase the tensile and crushing strengths of the concrete, rather than to reduce them. This is probably due to the fact that the vibration had the effect of compacting the concrete, filling the voids more completely, and driving out any air-bubbles.

General Organization.

The banks and river-bed making up the area included in the limits of Montreal harbor are owned by the Federal Government of Canada, represented by the Minister of the Department of Marine and Fisheries. Within the limits of the harbor is included the two banks and the bed of the River St. Lawrence for a distance of about 17 miles. The area of land, improved and unimproved, is approximately 350 acres.

By statute the administration and control of this property are intrusted to the harbor commissioners of Montreal, a corporate body having exclusive powers by Act of Parliament for the improvement and management of the harbor, subject to approval by order in council. Except for police and fire jurisdiction the harbor is quite separate from and independent of the city. The commissioners build and maintain all roads on their territory, do the electric lighting, and have absolute control of traffic. From absolutely unimproved shores in 1830, the harbor has been developed until now the value of the land, without including the extensive improvements, is much in excess of the bonded debt of about $20,000,000.

The present harbor commissioners are: Mr. W. G. Ross, president; Mr. Farquhar Robertson, and Lt.-Col. A. E. Labelle, with Mr. David Seath as secretary.

The number of sea-going vessels which arrived during 1913 was 820, with a total net tonnage of 4,690,535 tons, while an equal number of vessels with the same net tonnage departed.

Canadian Vessel Captains and Chief Engineers

Through the courtesy of the various Steamship Companies, we are enabled to give a list of 1914 season vessels, together with the names of their above-and-below-ship principal officers.

CANADA STEAMSHIP LINES.

Vessel.	Captain.	Chief Engineer.
Aletha	J. E. Rathbun	Spencer Thurston
Alexandria	Joseph Rinfret	Thos. J. S. Milne
America	C. J. Hinckley	James Gillie
Belleville	W. Bloomfield	John Kennedy
Berthier	C. Laviolette	L. Marie
Boucherville	A. Laviolette	C. Hamel
Brockville	D. B. Christie	Chas. McWilliams, Sr.
Cascapedia	John Hearn	E. Richards
Caspian	John J. Jarrell	William Dunigan
Cayuga	C. J. Smith	A. Main
Chicora	Thos. Allen	N. Griffin
Chippewa	W. Malcolm	H. Parker
City of Hamilton	J. L. Baxter	E. Hamelin
City of Ottawa	W. C. Cox	S. Murray
Corona	B. A. Bongard	A. J. Woodward
Geronia	J. Heffernan	J. Kane
Kingston	E. A. Booth	W. Chipman
Longueuil	H. Mandeville	H. Noel
Macassa	James Henderson	E. A. Prince
Modjeska	P. Walsh	J. Findlay
Montreal	F. X. La France	Nap. Beaudoin
Murray Bay	W. Gagne	A. Gendron
New Island Wanderer	W. C. Hudson	John A. Cook
North King	R. H. Carnegie	George Boyd
Quebec	L. R. Demers	A. Ouzilleau
Ramona	E. M. Charlebois	G. W. Willix
Rapids King	.....	J. Matte
Rapids Prince	Geo. Batten	Geo. M. Hazlett
Rapids Queen	J. P. Stephenson	Alf. Charbonneau
Rochester	James Owens	J. M. Cummings
Saguenay	Joseph Simard	A. Godin
Saronic	.....	.....
Syracuse	N. Heffernan	John E. Kane
St. Irenee	.....	Geo. Gagnon
St. Lawrence	John Bertrand	B. F. Farrell
Tadousac	Joseph Dugal	M. Latulippe
Thousand Islander	C. H. Kendall	W. M. Willix
Three Rivers	A. Mondor	C. Gendron
Toronto	H. W. La Rush	D. J. Leslie
Turbinia	B. W. Bongard	W. Noonan
Varuna	.....	James Walker

CAN. PAC. RY., B. C. LAKES AND RIVERS, NELSON, B.C.

Vessel.	Captain.	Chief Engineer.
Aberdeen	J. B. Weeks	W. Sutherland
Bonnington	G. Robertson	T. F. McKechnie
Castlegar	M. P. Reid	J. P. Sutherland
Hosmer	F. L. Orr	A. McLeod
Kaleden	F. Broughton	J. McRae
Kokanee	L. McKinnon	J. G. Cameron
Kootenay	G. Robertson	N. Hawthorn
Kuskanook	F. L. Orr	J. Donaldson
Minto	A. Forslund	J. Fyfe
Moyie	W. Wright	D. McLeod
Naramata	M. P. Reid	J. Sutherland
Nasookin	W. Seaman	D. H. Biggam
Nelson	W. Wright	.....
Okanagan	G. L. Estabrooks	W. Jacobs
Proctor	J. Fitzsimmons	P. H. Pearse
Rossland	J. Fitzsimmons	J. Fyfe
Sandon	G. Graham	C. E. McKenzie
Siamous	G. L. Estabrooks	W. Jacobs
Slocan	W. Kirby	J. Russell
Valhalla	J. Ferguson	T. C. l'Anson
Whatshan	J. Dougal	W. Edwards
Ymir	F. Swanson	W. Kelly
York	A. McDonald	W. Liver

CAN. PAC. RY., DETROIT RIVER CAR FERRY, WINDSOR.

Vessel.	Captain.	Chief Engineer.
Michigan	R. Brown	F. Merrill
Ontario	J. Carney	A. McDonald

CAN. PAC. RY., GREAT LAKES, PORT McNICOLL.

Vessel.	Captain.	Chief Engineer.
Alberta	F. J. Davis	C. Butterworth
Assiniboia	Jas. McCannel	A. Cameron
Athabasca	J. B. Currie	W. Lockerbie
Keewatin	M. McPhee	W. Lewis
Manitoba	J. McIntyre	R. Sinclair

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Vol. IV APRIL, 1914 No. 4

PRINCIPAL CONTENTS.

INSTRUCTION COURSES FOR OPERATORS.

BEGINNING with the May issue and continuing each month thereafter, an Instruction Course for firemen and engineer operators will form a feature of Marine Engineering of Canada. The subject discussed in each number will be dealt with in such manner as to make it complete in itself in addition to being relative to the whole, and all interested or engaged in the practice of marine engineering and who are desirous of not only being well grounded in the elementals, but are anxious to keep posted on and appreciate new developments, now so far-reaching and revolutionary, are invited both to study and appropriate the instruction given, and preserve each section for future reference.

The author of this Instruction Course has had a long experience in the practical work of this highly important accessory of commercial and industrial enterprise, as well as in the art of teaching, whereby others may easily become interested and consequently informed to their profit, and we feel sure that right from the start, to express our own opinions somewhat modestly, all sections of our readers will be gratified and much benefited. The following is a brief synopsis of the Course:—

Steam Engines—History, Principles, Construction, Valve Theory, Valve Setting, Steam Engine Cycle, The Bilgram Diagram, Indicator Diagrams, Compound Engines, Condensers, Valve Gears, etc.

Steam Boilers—Boiler Furnaces, Theory of Combustion, Smokeless Combustion, Boiler Operation.

Boiler Accessories—Pumps, Injectors, Feed Water Appliances, Exhaust Steam Heating.

Steam Turbines, Gas Engines, High-Speed Engines, Oil Engines, Refrigeration, Transmission, Switchboards, Dynamos, Motors, Electric Lighting, etc.

NAVIGATION OPENS LATE ON ST. LAWRENCE.

"THE latest in the past quarter century" is the appropriately descriptive phrase applicable to the opening of the 1914 season of navigation on the St. Lawrence. The fleet of icebreakers (so-called) owned by the Dominion Government have again signally failed to stand up to their work. We don't imagine, however, that the results are other than those anticipated by shipping men generally, but we do believe that the extremely disappointing display made this spring has shaken confidence in the sincerity of the efforts made and the capacity of those deputed to the task.

An utter lack of appreciation of the magnitude of the task of keeping the St. Lawrence free from being icebound so far on into the year has all along been quite apparent, in spite of the many optimistic official and expert opinions expressed. Icebreaking on the St. Lawrence by means of the present craft is on a par with driving a spike in a railroad tie by a tack hammer; in other words, the medium suffers more than the object to which the effort is directed, and were it not for the fact that a **real** icebreaker is now being constructed, and that by a firm who at one and the same time know how to, and will fulfill the task set creditably alike to themselves and to Canada, opinions otherwise notwithstanding, shipping men all over the Dominion might well become disheartened. Ice-breaking in the past has been more or less of a make-believe, as most other half measure reforms relative to navigation matters on the St. Lawrence have also been, so far as our Governments are concerned.

THE RECENT GULF TRAGEDY.

CANADIAN shipping again figures largely in recent disastrous happenings, and many lives have again been snuffed out. The sealing industry, if we might so term it, is one of those pursuits to which is attached more than ordinary risk, and it occurs to us that while the dangers attendant may not be altogether eliminated, some form of the widespread "Safety First" movement might find application scope, sufficient to largely minimize the risk. The response of behalf of the dependants on those who went down to a watery grave has, as in the case of the Lakes disaster last November, been again generous and creditable to us as a nation.

Marine News From Every Source

Ottawa, Ont.—It is stated that a contract for buoy service on the Detroit River, has been awarded to Kenneth Fraser of Detroit, Mich.

Pacific Coast.—Many new aids to navigation are to be established along the British Columbia coasts this year, and the lighthouse tenders are in for a busy season.

Hamilton, Ont.—It is stated that the Dominion Government have appropriated a million dollars for harbor improvements. A large part of the money will be spent in the development of Stipes Inlet.

Wiarton, Ont.—The Canadian Tug & Towing Co. has purchased the Homer F. Warren, of the Shannon & Gary fleet. The consideration is private. The Kerner is being fitted out, and will be taken to Wiarton.

Great Lakes Transportation.—Announcement is made of the incorporation of the Great Lakes Transportation Co. with a capitalization of $1,000,000, and head office in Midland, Ont. Mr. James Playfair formed the new concern.

Sault Ste. Marie, Ont.—The Lake Superior Dry Dock and Construction Co. is going ahead with its programme of building a dry dock and shipbuilding yard. The $25,000 forfeit given the city still remains on deposit by consent of the company.

S. George Boswell, chief engineer of the Quebec Harbor Commission, has just returned from a six weeks' trip to the Old Country. While on the other side, Mr. Boswell inspected a new crane, dredge and tug, which are being built for the commission.

The Corbett Foundry & Machinery Co., of Owen Sound, Ont., have recently patented and are now making a steam towing winch. The winch has a cylinder 8 inches diameter by 8 inches stroke, and will carry 200 fathoms of 1 inch hawser with spooling gear.

Port Arthur, Ont.—It is reported that the tender of the Port Arthur Construction Co., Ltd., has been accepted for the construction of the breakwater extension in Port Arthur harbor from its present termination opposite the C.N.R. coal docks towards Fort William.

Owen Sound, Ont.—Rumor here says that James Playfair will acquire the control of the Dominion Transportation Co., whose system includes the steamers on Georgian Bay, the Manitou, the Caribou, in addition to several tugs and steamers on Lake Superior.

Sarnia, Ont.—The engines of the Matoa steamer Matoa will be transferred to the steamer Peck. The Matoa is owned by the Reids, and was salvaged from the rocks at Point aux Barques. The Peck, which is at Detroit at present, is owned by the Reids and McKay, of Hamilton.

Will Mark Sailors' Graves.—The Goderich Town Council has decided to erect a tombstone over the grave of the five unidentified sailors whose bodies were washed ashore after the November, 1913, storm. A design of the tombstone was submitted to the council on April 2, and accepted.

Navigation Schools. — The Canada Steamship Lines Ltd., are opening navigation instruction schools at all the leading ports embraced by their various steamship services. Competent instructors have been put in charge and equipment necessary to practical demonstration work is being installed.

Toronto, Ont.—A fire in the boathouse of the Marine Construction Co. at the foot of York street, did considerable damage. The building, which is owned by the C. P. R., was damaged to the extent of $1,500, while the loss to the contents will amount to $2,000.. The whole is fully covered by insurance.

Collingwood, Ont.—The Collingwood Shipbuilding Co. has handed over to the Windsor & Pelee Island Navigation Co. the new passenger and package freight steamer "Pelee," which they built during the past winter. On April 15 the "Pelee" went on her trial trip, and maintained a mean speed of 14.6 miles per hour.

Montreal, Que.—Preliminary work on harbor improvements estimated to cost this season $3,000,000 has been commenced, and include the completion of the 20-foot channel by diverting part of St. Mary's current, electrification and extension of the high level railway, besides dredging and improvement of wharves and piers.

Ottawa, Ont.—Two million dollars for a harbor at St. Croix, Charlotte County, New Brunswick, was asked by a delegation which saw Hon. Robert Rogers and Hon. J. D. Hazen on April 1. It was claimed that the harbor is open all the year round, and is one of the best natural ports of Canada. The delegation got no definite assurance.

1914 Season of Navigation.—The Dalhousie City, with Captain Maddock in command, again opened the season of navigation at Toronto, and secured the harbor master's silk hat for that officer by arriving there on her first trip across Lake Ontario, from Port Dalhousie on the afternoon of Saturday, April 4. About 100 passengers were on board.

Shipmasters' Association.—The formation of a Fraser River Shipmasters' Association will probably be accomplished this month, and this new organization will back up local organizations in their fight for the rights and improvements due the Fraser River.

Rescue Work Rewarded.—King George presented silver life-saving medals to 232 officers and men of the fleet of steamers that assisted in the work of rescue when the Uranium Line steamer Volturno was burned at sea last October. The Board of Trade presented the sailors with $3,000 in cash and gave a set of plate to the captain of each of the rescue vessels.

Haileybury, Ont. — Improvements to the Haileybury water front costing several thousands of dollars will be made during the coming season and these improvements include the construction of a new wharf surrounding the market building and extending on each of the three sides for fifty feet, and a second wharf between Main and Marcella street.

The Polsons Iron Works, Ltd., launched on April 1, another of the six steel scows which they are building for the Quebec Harbor Commission.

The Dominion Engineering and Machinery Co., Ltd., has been incorporated at Ottawa, capital $2,000,000, to carry on business as general engineers and machinery merchants at Toronto. Incorporators—George M. Kelley and John D. Falconbridge, of Toronto.

The New White Star Liner "Britannic" will carry 34 engineers, and for the first time in the British mercantile service, the Britannic will carry a chief engineer, whose duty will be to consult with the captain and generally supervise the engineering department, and also a first engineer, who will not keep a watch but will superintend the engine-room staff.

St. John, N.B.—At noon on April 17 in the presence of a gathering of prominent citizens, Mayor Frink, on behalf of the Royal Mail Steam Packet Co., presented a gold watch and chain to Captain A. Burns, of the Government steamer Lansdowne, in recognition of his part in lifesaving, when the company's steamer Cobequid was wrecked on Trinity Ledges.

Quebec, Que.—Mr. A. Gravel, chairman of the Levis Board of Trade and member of the Quebec Harbor Commission, has received a letter from the well-known ship-building firm of Sir W. Armstrong, Whitworth Co., with reference to the establishment of a branch of that firm across the river at Levis, in connection with the new graving dock, on which work is to start in a few days.

Ottawa, Ont.—Tenders will be received until Monday, May 11, 1914, for the construction of harbor improvements at Port Hope. Plans, specification and form of contract can be obtained at this department and at the office of Mr. J. G. Sing, district engineer, Confederation Life Building, Toronto, Ont., and on application to the Postmaster at Port Hope, Ont. R. C. Desrochers, secretary, Department of Public Works, Ottawa.

Canada's Shipping.—According to the annual report of the Registrar of Shipping, which has just been issued, 344 new vessels, which were valued at $1,807,380 and had a total tonnage of 40,164, were registered last year. The amount of capital now invested in Canadian shipping is $26,908,950, and the number of vessels 8,545. The number of men and boys employed in the marine service is 43,968. Steamers number 3,847, with a tonnage of 711,512.

Ottawa, Ont.—A delegation from St. Stephen, St. Andrews, and Milltown, recently asked $2,250,000 from the Government for the improvement of St. Croix harbor at the mouth of the St. Croix river. A favorable report of the possibilities of this harbor was made by Engineer A. D. Swan, and the delegation from Charlotte county wished to emphasize the recommendation and to have the approval ratified in cash. Hon. Mr. Rogers promised consideration.

Hamilton, Ont.—While in Ottawa with the deputation from Hamilton and other cities urging greater waterways and hydro radials, Engineer MacCallum had a conference with Hon. Robert Rogers, Minister of Public Works, and was assured that by the time the new Welland Canal was completed, Hamilton's canal at the beach would be deepened to the standard of twenty-five feet and converted into two channels, instead of one, with a pier in the centre.

Sarnia, Ont.—The Northern Navigation Company's steamer Saronic has been sold to the Canadian Steamship Company, and it will be used as a passenger steamer on the St. Lawrence River. The boat has been on the run between Sarnia and Port Arthur since 1883. When she first left the shipyards she was known as the United Empire. At the time of her launching she was considered the acme of shipbuilding, and her size at that time was considered immense.

Licence Revoked.—Osmyn Berry, of the Merchants' and Miners' Packet Nantucket, which rammed and sunk the Old Dominion Liner Monroe, with a loss of 41 lives, off the Virginia Capes in January, has been found guilty of negligence, and his license has been revoked. A board of steamboat inspectors at Philadelphia divided the responsibility for the disaster between Captain Berry and Captain Johnson, of the Monroe. On appeal to Captain Seeley, the inspector commanding, Captain Berry has been held guilty alone.

Lakes Insurance.—A meeting of the Lake Underwriters' Association will be held shortly to fix the rate of insurance for the current season, which begins at midnight, April 15. In spite of the heavy losses occasioned by the disastrous storm on Lake Huron on November 9, last, when Canadian tonnage suffered a heavy blow with the sinking of four large freighters, together with a great loss of life, it is intimated by the underwriters that it is not likely the rates will be increased this year.

A Sea Dog's Retort.—A typical son of the sea—the master of the schooner Topaz—was being cross-examined in an Admiralty action, at Liverpool, recently, as to whether when he had hauled a riding light up to a height of over twenty feet—the plaintiffs suggested only ten feet—he could reach it with his hands. "No, damme," was his retort, "nor with your feet either." (Loud laughter.) Counsel: Now, just moderate your language, and remember where you are. Witness: But it's ridiculous to talk damned nonsense. (Renewed laughter.) No sailor man would tell you differently to that.

C.P.R. Marine.—An important change has been made in the management of the Marine Department of the C.P.R. in the eastern section. It has been announced that Capt. J. T. Walsh, who has been marine superintendent at St. John, N.B., during the winter season, has been made chief marine superintendent of all the Atlantic and Atlantic coast services of the C.P.R. with W. J. McGiffin as marine superintendent at St. John, and Capt. G. O. R. Elliott as marine superintendent at Halifax. Captain R. Archibald, formerly superintendent of the Bay of Fundy steamship service, relieves A. McGregor.

Navigation Companies Merging. — Negotiations are at present in progress looking toward the amalgamation of the Northern Navigation Co., and the White Pass and Yukon Route, which is largely owned by the Guggenheim interests. The Northern Navigation Co. has a fleet of thirty steamers, barges, etc., and has assets of approximately two million dollars. The boats are operated between Dawson and St. Michael, a distance of about 2,000 miles. The present overtures are being made by the White Pass and Yukon Route people largely on account of the rate war carried on in the north last year.

Marine Club Formed.—At a large attended meeting of Goderich sailors on March 28, a marine club was formed for the purpose of instructing the sailors in their profession. The officers elected were: Honorary president, E. N. Lewis, M.P.; president, Dan McDonald; 1st vice, A. Graham; 2nd vice, Chester McDonald; secretary, H. Davidson; treasurer, J. Bedford. The object in starting the club at this time of the year is to enable it to get a good-sized fund for next winter, when it will furnish rooms. It is intended to get some good instructors to lecture on marine matters, while social evenings are also planned. The movement will fill a long-felt want among the sailors of Goderich.

G.T.P. Steamship Services.—Captain C. H. Nicholson, manager of G.T.P. steamers, announces that the summer service of the company would provide for three steamers a week to Prince Rupert from Vancouver. The schedule will be maintained by the Prince Rupert, Prince George, Prince Albert and Prince

John, and became effective on March 30. The sailings from Vancouver will be on Mondays, Thursdays and Fridays at midnight. The Monday and Thursday sailings will be taken by the Prince Rupert and Prince George and the Friday sailing by the Prince Albert and Prince John alternately. The steamers will all connect with the train service at Prince Rupert both ways.

Little Boat Building.—St. John, N.B., once the greatest shipbuilding port in Canada, is gradually ceasing to even build small boats. Only a few boat builders are left, and they are finding it increasingly difficult to compete with boat building centres in Nova Scotia. At the present time prices for boat building material in St. John are practically probibitive, and lumber dealers will hardly fill orders for such material at any price. With the appearance of the motor boat, there has ben an increased demand for small boats by fishermen and pleasure-seekers, but there does not appear to be much likelihood of this industry attaining any importance, as it is getting no encouragement from the lumber people.

The Trent Valley Canal.—The contract for the second section of the western end of the Trent Valley Canal between Lake Simcoe and Georgian Bay has been awarded by the Government to the Inland Contracting Co. of Toronto. The amount of the contract is $712,258. The Severn River section was let some time ago to the York Construction Co. The contracts for the two remaining sections will be let in the near future, and it is expected that work will be in progress this summer, along the whole route from Lake Simcoe to Georgian Bay. The southern end of the canal, from Lake Simcoe to Trenton, will, it is expected, be practically completed by the end of this year. It will probably take two years yet to complete the western end of the canal.

Quebec for New Allan Liners.—It has been definitely stated by Mr. Andrew Allan that, owing to the shallow water between Montreal and Quebec, the two new Allan Liners, Calgarian and Alsatian, would use Quebec as their terminal port, instead of Montreal, which is the home port for the rest of the Allan fleet. The two boats will use Berth No. 2 on the embankment at Quebec. It has been stated by various Ministers of Marine that the Government aims eventually to secure a 35-foot channel up to Montreal, and it is apparent that, until this is achieved, the larger vessels, drawing 30 feet, will have to stop at Quebec. The first of the new liners to arrive up the river this season will be the Calgarian, which is due at Quebec on May 8, while the Alsatian will arrive May 22.

Steamship Offices Removal. — As the result of the merger of steamship companies under the name of the Canada Steamship Lines, Ltd., Port Arthur, once more comes in for a big loss, in the fact that the offices of the company are to be located at Fort William in the future. The offices of the Northern Navigation Co., which have been under the management of Mr. Brock Batten for so many years, and the offices of the Merchants Mutual Line which have been in charge of Mr. Walter W. Hall, will move to Fort William at once. The Canada Interlake Line, the Canadian Lake Line and the Inland Lines offices removed to the neighboring city some time ago. All these companies which form the merger will go into one big office at Fort William, and it is expected that a staff of 30 or more will be employed.

Montreal Harbor.—Lt.-Col. Labelle, Mr. Farquhar Robertson, with acting Chief Engineer Harvey of the Montreal Harbor Commission, after a recent inspection of the work being done in the vicinity of the dry dock at Maisonneuve state that the improvements will be completed by the first of July., so that the Canadian Vickers Co. will be in a position to lay down the keel of the new ice-breaker which they are to build for the Canadian Government. Col. Labelle in discussing the plans of the company at Maisonneuve, stated that he was more than surprised at the progress made by the Canadian Vickers Co. since his last visit to that part of the harbor, and he added that the commission would certainly do all in their power to get things quickly in shape for the company to begin the work which they have now on hand.

Romantic Use of Old Steamer's Bell. —Mr. Peter Denny, of the well-known shipbuilding firm of Dumbarton, has presented a steamer's bell to the Free Church Mission in South Africa, where it will be used to call the worshippers to church. The history of the bell is of special interest. It originally belonged to a vessel called the Lochfyne, which was built in 1857 by Messrs. William Denny and Brothers for the Loch Fyne herring trade, and was afterwards transferred to the Dumbarton Steamboat Co., as a luggage boat, trading for many years between Glasgow, Dumbarton and Greenock. When the steamer was broken up after nearly sixty years' service, the bell was handed to Mr. Denny as an interesting relic of the twelfth vessel built by his firm when in their third year of existence.

Rocket Life-Saving Apparatus.—The British Board of Trade announces that up to February 21, the number of lives saved by the rocket life-saving apparatus on the coasts of the United Kingdom since 1870 reached the total of 10,000. The rocket life-saving apparatus has been maintained and managed by the Board of Trade since 1857, but 1870 is the first year for which complete statistics are available. There are now 344 stations equipped with the full rocket life-saving apparatus, and 266 stations equipped with lifebelts and lifelines and other appliances for saving life. The apparatus is generally worked by his Majesty's coastguard, with the assistance of local volunteers, although in many places local volunteers alone are employed. Three hundred and eight life-saving companies are at present enrolled for this purpose, numbering in all over 4,600 men, in addition to life-saving brigades with a total membership of about 350.

The Aquitania.—The most notable event in the year's record of shipbuilding on the Clyde will certainly be—but for unforeseen and untoward happenings—the departure of the huge Cunard liner Aquitania from her builder's basin, her passage down the Clyde, and her trials for speed and other properties on the Firth. The Aquitania will leave the John Brown & Co. outfitting basin for the Tail of the Bank on Sunday, May 10, a day of the week upon which there is little inward and less outward traffic. In all likelihood the new Cunarder will have the all too narrow river practically to herself. The work of deepening the river, towards the cost of which John Brown & Co. generously and voluntarily contributed $50,000, is still going on. Every effort is being made to insure the safe passage of the liner to the Tail of the Bank. After a series of trials, the Aquitania will proceed to Liverpool, which port she is now billed to leave for New York on her maiden voyage on May 30.

Twin Port Shipments.—According to figures compiled by Joseph Redden for the Port Arthur Board of Trade, the combined ports of Port Arthur and Fort William, with shipments of 203,328,129 bushels of grain in the navigation year of 1913, lead all ports on the continent of America in shipments of grain. Figures for the leading ports are as follows:—

Pt. Arthur-Ft. William	203,000,000
Buffalo	172,000,000
Duluth-Superior	115,000,000
Montreal	54,300,000
Chicago	54,000,000

Another fact brought into prominence by the same compilation of figures is the remarkable increase in the shipments from these ports in United States vessels. In four years the amount

of grain taken out of Port Arthur and Fort William by United States vessels has increased by approximately five hundred per cent., while the increase in the amount taken out in Canadian vessels during the same period has been ninety per cent.

AMERICAN SHIPBUILDING CO.

IN connection with the passing of the quarterly dividends on the preferred stock of the American Shipbuilding Co., the directors announce that when disbursements are resumed they will be paid on a semi-annual basis. This action is taken because it has been found that the business of the company is of such a nature that it is not possible to determine the exact profits quarterly. In a statement to the stockholders the directors say in part:

"Notwithstanding the depression of the business on the Great Lakes, the net earnings of the company, actually earned up to date and conservatively estimated for the remaining three months, would undoubtedly be sufficient to pay the 7 per cent. dividend to the preferred holders for the fiscal year ending June 30, but as there have been certain construction losses on contracts taken prior to the beginning of this fiscal year, but not completed until subsequent thereto, and therefore not ascertainable until such completion, it has been decided to pass the dividend on the preferred stock for the balance of the fiscal year. This will enable the company to start the new year with these losses completely wiped out."

The statement reports a careful appraisal of the properties which shows the values placed thereon by the appraisers to be in excess of the company's book value. In the last six months the liabilities of the company have been reduced approximately $725,000. Quick assets are reported in excess of liabilities, and the entire assets of the company, after deducting all liabilities and the book valuation of patents and good will, show a surplus in excess of the entire capitalization.

THE GEORGIAN BAY CANAL.

SIR ROBERT PERKS, the well-nown British contractor, who is a leading spirit in connection with the furtherance of the proposed Georgian Bay Canal, speaking in Toronto recently, said: "From all I can learn here, I feel more and more firmly convinced that the Georgian Bay waterway will be built. The public sentiment of Canada seems to be more alive than ever to the great commercial importance of having the commercial products of the West taken by the shortest and cheapest routes which the canal would afford to the ocean, and to the advantage to the Dominion of bringing into the Great Lakes the ocean-going steamers of the world. Under the proposed scheme, ships of 10,000 and 12,000 tons could load up at the Canadian and American ports on the lakes and pass through the canal to the ocean. This would be of incalculable value to Canada."

Concerning the appointment of a Commission by the Borden Government to inquire into the commercial feasibility of the canal, he said, "the Government appears to be thoroughly satisfied as to its possibilities, and although there have been important inquiries made personally by committees of the Senate and by other Commissions as to the commercial uses to which the canal could be put and its probable trade, yet there is no doubt there are some aspects of the case which have not been considered in the detail which such a Commission as that of the Government ought to be able to deal with."

There was the difficulty, Sir Robert said, of inability on the part of any body of men to foresee the results of so great an undertaking. He instanced the wholly inaccurate forecasts of the Commission appointed to inquire into the possibilities of the Suez Canal. They were entirely at fault, he pointed out, and the subsequent success of the undertaking showed on what dangerous ground any Commission on such a project stood. He was convinced that the Georgian Bay waterway would prove of incalculable value to Canada.

THE TRAINING OF THE MARINE ENGINEER.

SO frequently do we receive enquiries from parents and guardians as to the necessary requirements for the training as a marine engineer that it may serve a useful purpose if we briefly recapitulate the steps and advise, as almost a first necessity, the procuring of a copy of the Board of Trade Regulations relating to the examination of Marine Engineers, obtainable through any bookseller, price, 10 cents.

In the regulations will be found most of the necessary information as regards preliminary apprenticeship, etc. Apprenticeship periods are usually for five years, and are best served with a firm manufacturing or repairing marine engines, although stationary engine and other machinery experience is allowed to count with additional qualifying service if below the standard required by the Regulations. The technical training required, apart from the apprenticeship, is in most districts obtainable at the technical schools, colleges or universities.

At the termination of the apprenticeship the opportunities of securing a berth on a steamer are most readily obtained at a marine engine workshop, a repair works, or on the shore staff of a fleet of steamers. The first few months may not be as a watchkeeper on a large vessel, and hence the qualifying service may be better obtained on a smaller vessel to comply with the regulations. The period of sea service required being complied with, the candidate is at liberty to enter for the second-class certificate examination, and after a similar period for the first-class certificate.

The regulations give four years as the minimum apprenticeship in the workshop, but most of the shipping lines require a candidate for an engineer's appointment on one or other of their steamers, to have served five years, and especially is this advocated in order that the practical workshop training may be more efficient.—M. E. & N. A.

SCOTTISH SHIPBUILDING.

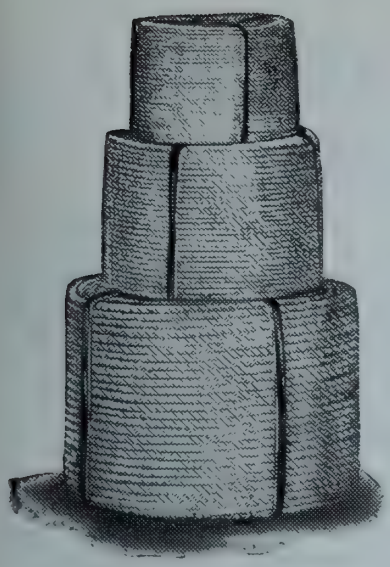
THE tonnage of the vessels launched by Scottish shipbuilders during March was small as compared with the figures for January and with those for March of last year, while the number and value of the new contracts reported indicate that the amount of work on hand in the yards will be reduced considerably in the course of the summer.

All over Scotland there were launched 26 vessels aggregating 34,191 tons, making a total for the three months of 120,690 tons. The Clyde total for March was the lowest since 1908, and the third lowest during the past 20 years. For the full quarter the Clyde total is the lowest since 1910, and it represents a decrease of nearly 22,000 tons as compared with last year, and of nearly 40,000 tons as compared with 1912. The following table shows the work of the three months all over Scotland:—

	Clyde		Forth.		Tay.		Dee.	
	Ves.	Tons.	Ves.	Tons.	Ves.	Tons.	V.	T.
Jan.	11	22,272	2	260	2	7,550	4	730
Feb.	21	49,082	1	4,381	1	1,500	4	724
M'ch	16	24,631	3	2,270	2	6,800	5	490
	48	95,985	6	6,911	5	15,850	13	1,944

The work of the Clyde during the first quarter of each year since 1880 is shown in the following table:—

	March. Tons.	Three Months. Tons.		March. Tons.	Three Months. Tons.
1914	24,631	95,986	1896	40,790	94,666
1913	61,053	117,858	1895	16,966	52,867
1912	52,205	135,340	1894	18,416	58,321
1911	60,355	126,707	1893	24,722	52,444
1910	30,723	90,658	1892	51,614	91,941
1909	27,198	71,113	1891	41,274	75,894
1908	22,028	60,084	1890	23,785	81,005
1907	43,943	121,852	1889	19,991	51,518
1906	58,478	129,533	1888	25,265	42,320
1905	42,714	105,415	1887	21,787	43,986
1904	44,813	100,804	1886	8,169	28,669
1903	33,629	87,461	1885	13,216	38,406
1902	33,419	97,265	1884	28,150	63,309
1901	35,430	106,450	1883	30,622	83,563
1900	31,440	88,520	1882	14,996	70,210
1899	53,355	110,555	1881	29,497	60,484
1896	36,028	75,290	1880	17,567	43,583
1897	32,735	59,439			



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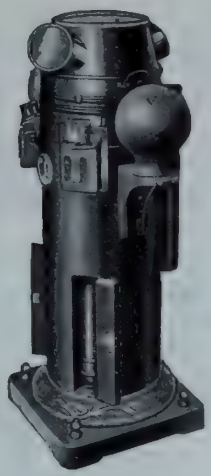

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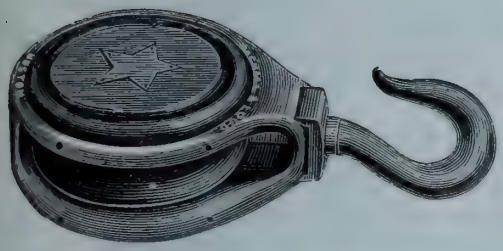

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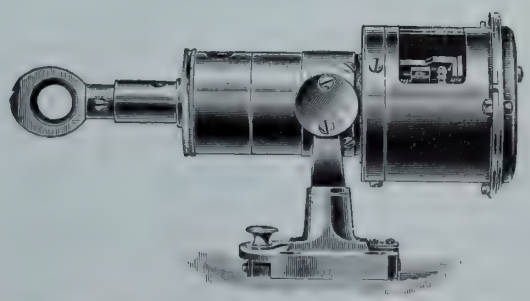

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ASSOCIATION AND PERSONAL

A Monthly Record of Current Association News and of Individuals Who Have Been More or Less Prominent in Marine Circles

Vincent Simpson, of Gerald Lomer Ltd., Montreal, is now in the West on a business trip. He will visit the principal cities.

H. Cameron, who has just arrived in this country from Glasgow, has taken up his duties as assistant manager of Canadian Vickers, Ltd., Maisonneuve, P.Q.

Captain E. J. Parsons, it is reported, has been appointed master of the recently-acquired quarantine tender Gunhild. Captain Parsons is well known in Victoria shipping circles as master of the Forager.

Ben. W. Folger, of Kingston, Ont., died in Toronto on March 26, aged 76. Mr. Folger was one of the founders of the Thousand Islands Steamboat Company, and later was instrumental in establishing the Kingston, Portsmouth, Cataraqui Electric Company.

James Cornelius Sullivan, harbormaster of the city of Quebec, and well known to shipping and railway men all over eastern Canada and the transatlantic route, died on March 23. He had been harbor-master sixteen years, and succeeded his father in the position.

Captain William Allen, well known among Great Lakes vessel men, died on April 20, at his home in Ford, Ont., where he has resided for fifty-two years. He was born in England in 1831, and came to Canada in a sailing vessel when eight years old. His wife and one son, Captain Wm. W. Allen, of the Canada Steamship Lines, survive.

William Newman, works manager of the Polson Ironworks, Ltd., Toronto, has been appointed, by the Vessel Fire Register, New York, chief inspector for the Canadian department of this company.

LICENSED PILOTS.

River St. Lawrence.—Captain Walter Collins, 43 Main Street, Kingston, Ont.; Captain M. McDonald, River Hotel, Kingston, Ont.; Captain Charles J. Martin, 13 Balaclava Street, Kingston, Ont.; Captain T. J. Murphy, 11 William Street, Kingston, Ont.

River St. Lawrence, Bay of Quinte, Murray Canal.—Captain James Murray, 106 Clergy Street, Kingston, Ont.; Capt. James H. Martin, 259 Johnston Street, Kingston, Ont.; John Corkery, 17 Rdieau Street, Kingston, Ont.; Captain Daniel H. Mills, 272 University Avenue, Kingston, Ont.

ASSOCIATIONS

DOMINION MARINE ASSOCIATION.

President—James Playfair, Midland; Counsel—F. King, Kingston, Ont.

GREAT LAKES AND ST. LAWRENCE RIVER RATE COMMITTEE.

Chairman—W. F. Wasley, Gravenhurst, Ont.
Secretary—Jas. Morrison, Montreal.

INTERNATIONAL WATER LINES PASSENGER ASSOCIATION.

President—A. A. Heard, Albany, N.Y.
Secretary—M. R. Nelson, New York. .. ....

THE SHIPPING FEDERATION OF CANADA

President—A. A. Allan, Montreal; Manager and Secretary—T. Robb, 526 Board of Trade, Montreal.

SHIP MASTERS' ASSOCIATION OF CANADA.

Grand Master—Capt. J. H. McMaugh, Toronto, Ont.; Grand Secretary-Treasurer—Capt. H. O. Jackson, 376 Huron St., Toronto.

GRAND COUNCIL, N.A.M.E. OFFICERS.

L. B. Cronk, Windsor, Ont., Grand President.
A. F. Hamelin, Montreal, Que., Grand Vice-President.
Neil J. Morrison, P. O. Box 238, St. John, N.B., Grand Secretary-Treasurer.
F. Reid, Vancouver, B.C., Grand Conductor.
A. J. Ross, Halifax, N.S., Grand Doorkeeper.
James Gillie and A. E. Kennedy, Kingston, Ont., Grand Auditors.

Mr. Newman's duties will consist of appointing local inspectors in the different ports and issuing certificates of classification on their various reports. All boats carrying certificates are granted a reduction in fire insurance rates by the various insurance companies.

Marine Engineers' Card Party.—On Saturday evening, April 11, the Port Arthur branch of the National Association of Marine Engineers held their annual smoker in the Campbell & Gibbon hall on Cumberland street. A progressive euchre party was also given for the benefit of the many visiting engineers at present "fitting out" their various steamers here, and a very pleasant and enjoyable evening was spent by those present, under the special direction of President Paloona and Secretary L. C. Villians, assisted by Bro. Richmond. At the close, Bro. J. Coolridge, of Owen Sound, was presented with a handsome pipe, he having the highest number of marks at the card games. Bro. A. Murray of Port Arthur, was presented with the consolation prize, as his strenuous effort to move around the tables proved unavailing.

St. George Boswell, chief engineer of the Quebec Harbor Commission, has just returned from a six-weeks' trip to the Old Country. The object of Mr. Boswell's visit was the inspection of the new apparatus for the Quebec harbor, which includes a 50-ton crane, a dredge, a floating grain elevator, and a service boat. The crane is being built by a well-known Glasgow firm, and the dredge, which is of the ladder pattern, is being constructed by Wm. Simons & Co., also of Glasgow. The service boat is a 125-foot, 1,000-h.p. craft, built on similar lines to the tug "Sir Hugh Allan," used

Directory of Subordinate Councils for 1914.

Name.	No.	President.	Address.	Secretary.	Address.
Toronto,	1	A. J. Fisher,	707 Bathurst St.	E. A. Prince,	59 Ferrier Ave., Toronto.
St. John,	2	H. E. Berry,		G. T. G. Blewett,	36 Murray Street, St. John, N.B.
Collingwood,	3	W. T. Rennie,	Collingwood,	Robert McQuade,	P.O. Box 97, Collingwood,
Kingston,	4	S. M. Murray,		James Green	
Montreal,	5	A. F. Hamelin,	3210 Le Tang Street,	O. L. Marchand,	St. Vincent de Paul, P.Q.
Victoria,	6	Alex. McNivern,	P. O. Box 234.	Peter Gordon,	808 Blanchard St., Victoria, B.C.
Vancouver,	7	Andrew T. Roy,	1212 Burrard St.,	E. Read,	859 Thurlow St.
Levis,	8	Helaire Mercier,	3 St. Joseph St.	S. G. Guenard.	Lauzon, Levis, P.Q.
Sorel,	9	Geo. Gendron,	Sorel, P.Q..	Al. Charbonneau.	P.O. Box 132. Sorel. P.Q.
Owen Sound,	10	W. Robertson,	1030 4th Ave. East,	Richard McLaren,	447 13th St., Owen Sound.
Windsor,	11	Alex. McDonald,	28 Crawford Ave,	Neil Maitland,	221 London St. W., Windsor, Ont.
Midland,	12	Jos. Silverthorne,		Jno. A. Murphy,	Midland, Ont.
Halifax,	13	D. J. Murray,	Victoria Rd., Dartmouth,	Chas. E. Pearce,	Portland Street, Dartmouth, N.S.
Sault S. Marie,	14	Thos. O'Reilly,	153 Queen St.	Geo. S. Biggar,	43 Grosvenor Ave., Sault Ste. Marie.
Charlottetown,	15	J. F. McGuigan,	38 Queen St.	Lem Wincheste-.	302 Fitzroy St., Charlottet'n. P.E.I.
Twin City,	16	Arthur Abbey	Fort William, Ont.	John A. Smith.	Fort William, Ont.

by the Montreal Harbor Commission, and is being built by the Smith Dock Co., of Middlesboro, as is the floating grain elevator. The grain elevator when completed will be capable of taking a load of 35,000 bushels, and will be able to load in about four hours. All of the above are expected here in June. Mr. Boswell also visited a number of the harbors of the Old Country, including Liverpool, Glasgow, Southampton, Bristol, Avonmouth and the London docks.

HENRY BEATTY DEAD.

A WELL-KNOWN figure in C.P.R. marine circles passed away somewhat suddenly on April 10, at his residence, 207 Simcoe street, Toronto, in the person of Mr. Henry Beatty, former manager of the lake steamship lines of the Canadian Pacific Railway. Mr. Beatty, who was in his 80th year, was born at Cootehill, County Cavan, on May 1, 1834. When he was only nine years of age, Mr. Beatty came to Canada. It was in 1870 that he started in the steamship business owned by his uncle, William Beatty, and his cousins, James H. and John B. Beatty. The company was known as J. & H. Beatty & Co.

In 1877 this became the Northwest Transportation Co., with the boats Manitoba, Ontario, Quebec and the Sovereign, plying on the upper lakes, with headquarters at Sarnia, and known as the Beatty Sarnia Line. For a period of five years, until 1882, Mr. Beatty managed this line. Then, in the fulfilment of a promise made to the then Mr. George Stephen, later Lord Mount-Stephen, Mr. Beatty joined the C.P.R. He had promised to take charge of their boats when they were ready. At that time the C. P. R. was not a company but a syndicate.

Mr. Beatty was the manager of the C. P. R. lake traffic until the end of 1892, since when he had acted in an advisory capacity, and also as the representative of the English Marine Underwriters.

The deceased gentlemen leaves a widow and four children: Dr. H. A. Beatty of Toronto, Mr. E. W. Beatty, general counsel of the Canadian Pacific in Montreal, Mr. George M. Beatty of Toronto, and Miss Mary H. Beatty of Toronto.

WEATHER PROBABILITIES EXPLAINED.

MR. R. F. STUPART, Director of the Meteorological Service of Canada, gave a most interesting illustrated address a few weeks ago, before the members of the Canadian Institute, at the Physics Building, University of Toronto. The subject was "The Canadian Storm-Warning System." By means of charts, the distribution of atmosphere over the globe's surface and the resulting winds were explained.

"The great disturbing element is temperature," said the speaker. "There is a difference in temperature between the Equator and Poles of about 80 degrees, and in winter the difference is much greater. The air near the surface over the equatorial regions is greatly heated, and expands, with the result that over the Equatorial regions, any given barometric surface is at a greater height above the earth than it is over regions both north and south, and in consequence of this the upper air flows away both north and south, and surface air from north and south flows towards the Equator. The air in the upper regions, as it goes north and south towards converging meridians, accumulates between 25 degrees and 35 degrees, and the effect of this is the high barometer of this subtropical zone.

"Another important agency affecting the movements of air currents is the rotation of the earth, which causes a deflection to the right of the initial movement in the Northern Hemisphere, and to the left in the Southern. This leads to the surface currents in the tropics being from N.-E. instead of from N. and S.-E. instead of from South.

Studying Storm Movements.

In addition to the temperature difference between Equator and Pole, there are temperature differences between continent and ocean, which are reversed by the season; and with this latter system of variable air circulation impressed on the former more stable system, there is a resultant system of vast complexity; but one in which many of the component factors are closely discernible."

"Weather maps," said the lecturer, "were first instituted on this continent in 1870, at Washington, D.C. Forecasts were sent from there to various stations throughout the States and to Toronto. Toronto in turn sent them to the few stations that Canada then possessed. At that time the observatories of Canada were in charge of non-commissioned officers of the Royal Artillery.

"Until 1876 all the forecasts for the Great Lakes came from Washington. Then the Dominion took over the work and sent out its own weather maps. At that time there were ten stations in Canada, which number had increased to fifty-four in 1894 and has steadily grown larger since."

A few explanations of the well-known weather maps with examples were thrown upon the screen, and, in all of them, it was shown that with very few exceptions our storms come from the southwestern States.

November, 1913, Storm.

"With all the experience of thirty odd years," said Mr. Stupart, "it would have been impossible to predict that memorable storm of November last." By means of maps, there was shown the general drift of the storms that we get. They come from the southwest, move northeast until in our vicinity, and then pass along the St. Lawrence Valley to the sea.

"Concerning the terrible storm in November last that wrought such havoc: on the 6th a high pressure area was centred about the State of Virginia and a storm was just disappearing out of the Straits of Belle Isle. According to the ordinary course of things, the high pressure area should have passed over us, bringing fine weather with it, but by the next day it had become a low pressure area and was soon due. Accordingly at 11.00 a.m. the heavy gale signals were hoisted.

"On Friday, November 7, the gale was increasing and the barometer falling rapidly, but by Saturday the original storm showed signs of dispersing. Another storm was however, forming just to the south of Florida, which by the usual behavior, should pass up the coast to the Maritime Provinces and thence out to sea, but it came up the Atlantic coast for some distance and then actually moved northwest to the Great Lakes, giving us the third lowest barometer that has ever been registered. This low pressure area remained practically stationary for twelve hours over the Great Lakes, causing the terrific weather."

Variance of Atmospheric Pressure.

One member asked Mr. Stupart whether they could predict the probable variance of atmospheric pressure. "We flatter ourselves that we can," he replied, "in fact, we must be able to do so in order to forecast the weather. During the past month, the storms in the Maritime Provinces have been both severe and frequent, yet in predicting them we have attained close to one hundred per cent."

Another inquired as to the speed of a storm's progression. The answer was about thirty-five miles an hour in the winter and half that speed in summer.

In reply to another query, he said, "No, we do not get reports from ships at sea as do the European countries, but we receive reports from points throughout the whole of the northern hemisphere."

The question of the use of wireless was brought up, and Mr. Stupart said that every night the weather forecasts are sent to Midland, where they are disseminated to those ships equipped to receive them. He also said that ships then off the coast of Newfoundland were due to face one of the severest of storms experienced in years, which they did.

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Vol. IV. Publication Office, Toronto—May, 1914 No. 5

Powerful Bucket Dredges for St. Lawrence Ship Channel

By C.T.R.

A perusal of the accompanying article serves to emphasize, if such be necessary, the fact that shipbuilding and marine engineering are live industrial factors in the progress and development of the Dominion of Canada, and indicate in an unmistakable manner, that, by receiving the loyal support of our Government and that of the various shipping companies the men behind the above-mentioned twin enterprises are able to compete successfully with their fellows of other countries.

THE Collingwood Shipbuilding Co., Ltd., Collingwood, Ont., have recently completed two powerful bucket dredgers with central well for the Canadian Government Department of Marine and Fisheries. These vessels are the largest of this type yet built in Canada, and are intended to operate in the St. Lawrence ship channel. The principal dimensions are as follows:

Length, B.P. .....215 ft.
Breadth, moulded ..... 37 ft. 6 ins.
Depth, moulded ..... 14 ft. 0 in.

They are built under Lloyd's special survey to take the 100-A.1. dredger class and under Government inspection.

Dredging Gear.

The dredging gear and propelling machinery are of exceptionally heavy design in order to cope with the hard pan and rock which is encountered in many parts of the St. Lawrence River. The ladder is of very substantial construction, 117 ft. long and is arranged to accommodate a chain of 40 buckets, each of 27 cubic feet capacity. The buckets have cast steel backs, heavy boiler plate bodies and manganese steel lips, and each one is provided with four heavy cutting teeth with tool steel points. The bucket links are forged and the pins and bushings are of manganese steel. The tumblers are of cast steel, the bottom one being six-sided and the top one five-sided. To stand the wear and tear, the bottom tumbler shaft is fitted with a hard steel liner and a manganese steel bush in halves. When the ladder is at an angle of 45 degs., the dredge can dig to a depth of 52 ft. below the water level.

Propelling Machinery.

The propelling machinery consists of one set of triple expansion, surface condensing engines of the Collingwood Shipbuilding Co.'s make, with cylinders 15 in., 25 in., and 42 in. diameter, by 26 in. stroke. A clutch is arranged between the crank shaft and propeller in order to disconnect when the vessel is digging. Forward of the engine, a heavy change speed gear arrangement is fitted, having a double clutch so as to give two speeds on the chain of buckets, the low speed being 10 to 12 buckets and the high speed 18 to 20 buckets per minute, the latter speed being intended when dredging in soft material. The vertical shaft driving the top gears and surge wheel is 11 inches diameter, and all the gears and pinions are of cast steel. The surge wheels are each 15 ft. 6 in. diameter, the outer rim having double helical teeth. The friction is arranged by means of brass-faced cod pieces and tightening screws. The boilers are of the usual marine type, two in number, 11 ft., 6 in. diameter, by 10 ft., 6 in. long, fitted with Howden's forced draught, and arranged to work at a pressure of 180 lbs. per square inch.

Engine Room Auxiliaries.

A very complete installation of engine room auxiliaries has been fitted and comprises 10 in., 20 in., 10 in. vertical monotype air pump, one pair of direct-connected feed pumps, 7 in., 5 in., 15 ins.; one vertical duplex general service pump 7½ in., 4¾ in., 10 in.; one 6 in. centrifugal circulating pump, two vertical simplex bilge pumps, 6 in., 5 in., 10 ins.; two vertical duplex sanitary and feed water pumps 4½ in., 4 in., 5 in.; one G. & J. Weir surface feed heater, and one See's ash ejector in each boiler room. A complete electrical installation is fitted, there being two 11 k.w. machines, either one of them being capable of handling all the lights aboard the vessel. A 24-in. diameter searchlight of 25,000 c.p. is fitted on the shade deck aft for use in reading draft gauges on the river at night. A 60-in. Howden fan is fitted for supplying the necessary forced draft to the boilers. The engine room is very large and is supplied with abundance of air, light and ventilation, which is a special requirement for the heat experienced in the St. Lawrence River during the summer months.

Deck Auxiliaries.

The deck auxiliaries consist of one 9-in. by 18-in. bow winch situated on a flat under the main deck with special lead for chains through a hatch on the upper deck. The drum of the winch is designed to accommodate 4,000 ft. of 1½-in. steel wire rope and 300 feet of 1½-in chain. There is one 9-in. by 16-in. stern winch, and two 9-in. by 16-in. breasting winches. The latter have drums arranged to handle the port and starboard wires, and each winch is capable of accommodating 4,000 ft. of 1¼-in. wire rope and 300 ft. of 1¼-in. chain cable. Six anchors are fitted for working the vessel, one bow, one stern and four breasting. These are of the ordinary type with stocks, and are of suitable weights for securely mooring the dredge when working.

A powerful engine and drum has been installed in the lower hold on the

POWERFUL BUCKET DREDGE FOR S T. LAWRENCE RIVER SHIP CHANNEL.

starboard side for handling the heavy bucket ladder and its equipment. The engine is of the vertical type with two cylinders 14½-in. diameter by 13-in. stroke, and like the deck auxiliaries, operates with steam at 90 lbs.

The hoisting rope is of special plow steel, 1¾ in. diameter, and the drum on the hoisting engine has been made large enough to accommodate all the rope without riding. In addition to the main hoisting rope, steel wire preventers 2¼-in. diameter, are fitted to each side of the bucket ladder for use should anything go wrong with the side rods. The hoisting sheaves are of cast steel 4 ft. 6 in. diameter, specially arranged to take the above cable, the bottom and top blocks having five sheaves each, while a special idler sheave is fitted on the top of the bow shearlegs. These shearlegs and the main framing have all been specially designed to take care of the heavy strains which come on them owing to the massive design of the bucket ladder and the other dredging gear.

A winch 6 in. by 8 in. has been installed on the port side to handle the side chute. One side chute only has been fitted in the meantime, but arrangements have been made so that in the event of the vessel having to discharge on the starboard side, a chute could readily be installed. For handling barges, two 8-in. by 8-in. capstans, have been installed on the main deck on the port side.

The steering gear consists of a 5½-in. by 5½-in. steam engine situated on the upper deck inside the engine casing, the customary lead of chains, spring buffers, quadrants, etc., being fitted. The gear is also arranged to operate by hand. A steel derrick post with steel derrick is fitted on the port side of the main deck and arranged in such a way that it can readily handle the buckets when these have to be changed. It is also arranged to serve the hatch over a workshop which has been fitted on the lower deck forward.

General Equipment.

The accommodation for the dredging master and officers is fitted on a promenade deck aft., and has been designed to give as much light and air as possible. The crew are accommodated with large rooms on the lower deck forward. These vessels usually work day and night throughout the season of navigation, and, therefore, accommodation for a double crew has been provided. Suitable galley, pantry, storeroom and lavatory quarters have been provided.

The forepeak has been arranged for water ballast, and a reserve feed tank has been fitted immediately aft of this for use if ever the vessel goes to salt water. Fresh water tanks are incorporated with the ship's structure just forward of the coal bunkers. Complete arrangements for pumping and draining, heating and ventilating have been installed and a full equipment of telegraphs, nautical instruments, river and dredging lights, etc., has been supplied together with a generous supply of spare parts for all the machinery and dredging gear.

Both ships were practically completed last autumn, but could not be got away before the close of navigation owing to the poor delivery of important materials, and had, therefore, to be held until the opening of navigation this year. The first vessel successfully carried out digging and speed trials on the 23rd and 24th of April under the supervision of Mr. McNab, assistant constructor, Mr. Mr. Forneret, the chief engineer of the St. Lawrence Ship Channel, and Mr. Steadworthy, dredge master. The horsepower developed was 950 at 120 r.p.m., with steam at 180 lbs. per sq. in. which is well over the specified requirements. The second vessel's trials were equally successful and were completed on May 6. Both dredges left Collingwood for Sorel, P.Q., a distance of over 1,000 miles, on May 9.

C.P.R. Terminal Improvements, Vancouver, B.C.

As the work in connection with the above is rapidly nearing completion, the accompanying illustrations may be of interest, giving as they do an idea of what is projected and at the same time an indication of the progress which has been made.

IT will be recalled that the general scheme of the C. P. R. Vancouver terminal improvements, embraces a passenger station and office building located on land immediately east of the present passenger station, while another dock 200 x 490 feet has been built. A particular point of interest in this work was the use of piles 135 feet long on the pier end.

The main entrance to the station is located on Cordova street with the main waiting room on the street level. Tracks are located about 25 feet below this level and there is provision for four passenger tracks separated by wide platforms. Stairways and lift connect the two levels of the station and a separate foot-bridge is carried over the passenger tracks directly connected with the waiting room at one end and with the stairways leading to the track level, thus giving access to the platforms without crossing the tracks at grade.

In order to avoid a grade crossing and the consequent delays to traffic between the city and the piers, a steel viaduct is being built on the line of Granville and Burrard streets, passing over the tracks to the piers. An incline is also being built on the west side of the Granville street viaduct to the wharf, thus giving access to the lower deck of the pier and freight sheds, and to the water front.

ELEVATION TRACK SIDE OF C.P.R. PASSENGER STATION, VANCOUVER, B.C.

The passenger station is a combination stone and brick structure with a steel

frame. It is divided into two principal levels, on the lower of which are the baggage, mail and express rooms, while on the upper are the ticket offices and waiting rooms. Above the public rooms in the station, the space will be devoted to the general offices of the railroad company. The interior arrangement of the office space will be on the unit system, and each unit will have complete heating and lighting facilities, with partitions that may be readily installed or removed as changes in the arrangement of office accommodations become necesary. The principal problem was to provide easy and economic communication between the city, the railroad station and the piers, these last introducing an element which is unusual to most railroad terminals so far as passenger traffic is concerned.

C.P.R. NEW JETY PIER "D," VANCOUVER, B.C.

It is expected that the station will be ready for occupancy during the summer, and that the steamship station facilities will be available somewhat earlier, although due to the necessity of removing the old station before the viaduct can be built on the extension of Granville street, the use of the present grade crossing over the freight yard tracks will have to be maintained for a month or two longer.

Barrett, Blackader & Webster, of Montreal, are the architects for this work, while Westinghouse, Church, Kerr & Co., also of Montreal, are the engineers for the complete design, construction and equipment of the terminal, working in co-operation with the officials of the Canadian Pacific Railway Co.

NEW C.P.R. ATLANTIC LINERS.

THIS season will see the Atlantic service of the C.P.R. augmented by the addition of two new steamers. These two vessels will be of the one class cabin type, which are becoming so popular. Barclay Curle & Co., of Glasgow, secured the contract for the building of the ships some months ago, and work on them is well under way. They are being specially constructed for the Atlantic service, and will contain every possible convenience for the comfort of passengers. They will be of the "one class" type, with passenger accommodation for 520 second and 1,200 third class.

The new vessels have been named the "Missanbi" and the "Metagama." Their length will be of 520 feet, greatest breadth 64 feet, while the breadth of the passenger deck will be 41 feet. Each vessel will have a deadweight capacity of 7,950 tons, with an approximate cargo capacity for 6,000 tons. The cruiser stern, which is the feature of the new Empresses recently placed on the Pacific Coast, is again being introduced, and the new ships will also have six complete steel decks.

In order to ensure safety, the hulls are to be sub-divided by water-tight doors and bulkheads, so as to be capable of floating when three compartments are open. The water-tight bulkheads and doors will be automatically controlled from the bridge. The speed of each vessel will be 15 knots, with a draught of 27.5 ft.

As for the interior of the vessels, each second-class stateroom will be fitted with a wardrobe and chest of drawers, folding lavatory with mirror, and other conveniences. The public rooms will be dining saloon, smoking-room, lounge and drawing-room. The refrigerating plant will be capable of making 300 lbs. of ice per eight hours, while the vessels will be heated and ventilated on the thermo-tank system, giving a change of air eight times each hour. There will also be a printing plant on board each vessel.

THE ST. LAWRENCE ICEBREAKER.

THE large icebreaker for the St. Lawrence to be built by the Canadian Vickers Co., Montreal, will cost $998,593. The keel is to be laid some time next month, and delivery is to be made in the fall of 1915. The principal dimensions are:—Overall length, 292 feet; length b.p., 275 feet; breadth moulded at l.w.l., 56 feet; extreme breadth, 57 feet; depth moulded, 32 feet; mean draught, 19 feet; horsepower, 8,000.

All materials as far as possible will be purchased in the Dominion, but the boilers, engines and auxiliary machinery will be built at the works of Vickers, Ltd., in England, as the plant at Maisonneuve is not yet sufficiently complete to allow of the work being done there.

NEW C.P.R. "ONE CLASS" TYPE ATLANTIC LINERS.

Breakdowns at Sea -- Those Relating to Boilers

By R. W. Thompson

The accompanying article is an abstract from a paper read before the Graduate Section of the North-East Coast Institution of Engineers and Shipbuilders. It brings under review the prevailing troubles experienced in the operation of marine boilers, and seeks to point out the steps that should be taken to prevent their occurrence and to minimize their effect relative to the vessel service.

BOILER troubles can be brought together under three heads—Leaking joints and tubes and stays; pitting and corrosion; cracks and local collapse. Leaky joints and seams may be due to the unequal expansion of the top and bottom of the boiler, caused by defective circulation. The latter may be improved in certain cases by removing the row of tubes immediately above the furnaces, while an ordinary cast iron house drain pipe hung vertically between the combustion chambers will promote the circulation. Rivet holes not being quite fair, and rivets that have been allowed to get cold before being riveted over, often give considerable trouble in the after working life of the boiler.

Attempting to caulk rivets is only a waste of time, it being better to cut them out, rimer the holes fair and re-rivet. Leaking tubes are caused by allowing the necks of the tubes to become covered with scale, and this sets up unequal expansion between the tube and the tube plate. The admission of cold air into the furnace has also a tendency to start the tubes leaking. Firemen should always be instructed to open and close furnace doors with the minimum delay consistent with economical firing.

Burst Tubes.

In the event of a tube bursting, the fires should be immediately drawn out, and the water level in the boiler kept normal by pumping in water from the ballast tanks or sea. The safety valves should be eased so as to reduce the pressure to nil. A stopper is then inserted into the tube. With the ordinary type of stopper, this necessitates a man going into the combustion chamber to adjust one end, which is a very hot job, and the risk of being burnt great; but with the patent tube stoppers the whole operation may be conducted from the outside of the boiler with very little trouble.

Burst tubes occur in donkey boilers more frequently than in the main boilers, since the donkey boiler feed water is nearly always salt water or water containing sewerage, which is bound through time to eat into and destroy the tubes. Stay tubes being about twice the thickness of ordinary tubes, they seldom burst; generally they last the life of the boilers. When the question of re-tubing an old boiler comes up, it is often difficult to decide how many to renew. If we have several burst tubes scattered here and there it would be advisable to renew all the plain tubes, and if we were only going to renew one or two tubes situated in the centre of a nest, we should have to draw them out by means of plate washers and a drawbar, etc. If renewing all the plain tubes, the easiest way would be to cut right through them with a rod chisel and quarter hammer about 1 in. from the tube plate, the portion of tube retained in the tube plate being afterward ripped with a flat chisel and hand hammer. After removing all tubes that have been cut out of the boiler, the opportunity should be taken to thoroughly clean the tube plates, stay tubes and other portions of the boiler that are difficult to get at when all tubes are in place.

The new tubes should now be placed in position and then expanded. Formerly this was done by driving conical drifts into the ends of the tube. The present practice is to use a special tool, which is known as a tube expander. It consists of three or four small rollers partly projecting out of the circumference of a mild steel encasement. A tapered mandrel is placed in the centre, and driven in while being turned round, thus causing the rollers to revolve and at the same time expanding the tube securely into the tube plate.

Leaking stays should be caulked or fitted with a grummet and plate washer. Broken stays should be renewed at the first opportunity, as there is always the possibility of other stays in the same locality breaking, and the combustion chamber back would then buckle, crack or collapse.

Corrosion.

Care must be taken to guard against pitting and corrosion, which are set up owing to the impurities in the boiler water. The impurities usually occurring in boiler water are sea water mixed with the feed, air or gases in solution, oil or grease, lime or soda (intentionally added to feed). The objections to sea water in the feed are at once seen if we look at its chemical analysis. The average composition is sodium chloride, 77 per cent.; magnesium chloride, 10 per cent. (excessively soluble, and never deposits unless the density is up to 7-32); magnesium sulphate, 6 per cent.; calcium sulphate, 4 per cent.; calcium carbonate, ¾ per cent. (about 5 per cent. lime salts deposit at 35 sq. in. by gauge=281 deg. F.); other substances by diff., 2¼ per cent.; 1-33 part of sea water is solid matter, therefore, 2240÷33=68 lbs. of solid matter per ton. It is the calcium sulphate which separates out practically pure and forms a hard crystalline deposit which is the worst constituent of sea water. In the first place, oil is liable to get on to the heating surfaces and form a dangerous non-conducting film, which may result in a serious accident, owing to the overheating of a plate and its subsequent collapse. Secondly, oil, especially animal or mineral, is liable to decompose at high temperature, and, like magnesium chloride, but to a very much greater extent, to form acids which corrode and destroy the heating surfaces with the same dangerous results. Oil in boiler water has a tendency to cause priming. An occasional scumming of the boiler will, however, prevent it from accumulating. Air or gases are also liable to set up corrosion and rusting, and it is possible that they may lead to explosions in the feed tanks or filters, or in any part of the system not constructed to stand high pressure. The objection to the use of lime is that it may form a non-conducting deposit like calcium sulphate, and cause a serious loss of efficiency or overheating and consequent collapse.

Tests for Boiler Water.

Salinometer test for density; nitrate test for salt; phenolphthalein test for alkalinity; litmus paper test for acidity. The salinometer is an instrument which floats at various levels, according to the density of the water. For marine use it is graduated from 0-32—4-32, 4-32 being considered the maximum density at which it is safe to operate a boiler, having in view a margin of safety against "salting the boiler," which would be disastrous. In practice it is best to keep the density as low as possible.

The nitrate test for salt is extremely delicate. A few drops of silver nitrate solution will give a white precipitate with even the slightest trace of chloride or common salt. It is often just necessary to taste the water to detect the presence of salt; the palate is not nearly as sensitive, however, as silver nitrate. Acidity is probably the worst evil in boiler water, salt being not of much moment unless it is present in sufficient quantities to produce damaging deposits, and oil may, more or less, be kept out by efficient filters, etc. The presence of acid, however, even in the smallest quantity, will set up dangerous corrosion, and to safeguard against this the boiler water should be kept slightly alka-

line by dissolving lime in the feed water or sometimes by common soda. Soda is never used in water-tube boilers, as it has a tendency to cause priming, and also it combines with the oil and forms into viscous lumps or balls. The solution of lime, generally spoken of as milk of lime, is put into the feed water at regular intervals, through a special cock fitted to the air pump.

The phenolphthalein test for alkalinity is very delicate; a few drops of this solution produces a deep red color in a sample of boiler water that has any trace of alkalinity. Red litmus paper turns blue if water is alkaline; blue litmus paper turns red if water is acid; methyl orange turns red if water is acid. To prevent corrosion in boilers it is usual to introduce zinc plates in metallic contact with the furnaces along the line of fire bars, and between the combustion chambers. The zinc plates should be made from best rolled zinc, say, 12 in. by 6 in. by 1 in., and having a 7/8 in. hole through for connecting them to the studs which are screwed into the furnaces to receive them. The zinc plates between the combustion chambers are suspended from the stays by specially constructed hangers. A mixture of white zinc and paraffin oil is very beneficial to any local corrosion or pitting. Before applying this mixture, the plate should be scraped thoroughly clean.

External corrosion may be due to weather, and to leaving damp ashes against boiler ends. This can be prevented by cementing the boiler ends and fitting guards so that the damp ashes do not come into contact with the boiler plates. Incidentally the heat radiated from the boiler to the tank top causes vapour to rise which causes corrosion of the ballast tanks, particularly the tank top. This may in some measure be prevented by covering the tank top with bitumastic. Again, some firms leave the boiler room tank off, which is a source of great annoyance in heavy weather, with seas coming into the stokehold and washing coal, ashes, etc., into the tank and thus choking up the strums. The tanks may be galvanized and left dry.

Cracks.

Cracks are liable to occur anywhere about the heating surfaces. They may be due to the overheating of the plate, the admission of cold air, fatigue of material or laminated plates. The cracks may be prevented from spreading by drilling a small hole through the plate at each end of the crack, and then screwing a bolt or rivet into the hole and riveting it up. Cracked tube plates may be repaired by chain riveting or by fitting a spectacle piece. Furnace cracks may also be chain-riveted, but it is not advisable to attempt chain riveting with a crack over 8 in. If the crack exceeds 8 in. it is best to fit a patch until arrangements can be made to have it electrically or autogenously welded. The landing edges of the plates in the combustion chamber are often cracked or burned, due to the excessive heat. Formerly this would have meant renewal, but the welding systems can build up the landing edges and weld the cracks, thus making the boiler almost as good as the day it was made.

Furnace collapse is brought about by overheating, due to deposits of scale or oil. It is now considered good practice to trammel the boiler furnaces once a month, so as to be able to detect any signs of fatigue or collapse.

NEW NAVAL POLICY EVOLVED.

THE Government has evolved a new naval policy, which will be acceptable to the Quebec Nationalists and at the same time give some appearance of doing something at last toward preparing for another possible "emergency." It is arranging for a Canadian naval service without warships. An Order in Council has been passed providing for the creation of a Canadian Naval Reserve along the lines adopted years ago by New Zealand and Cape Colony. It is a somewhat dilettante and inadequate way of handling the old "emergency," but it is free from political embarrassment, and provides scope for a small expenditure of money in Canada, which may be used to good political effect.

Outline of the Scheme.

The general principle of the creation of a naval reserve was endorsed by the Cabinet recently, and the Order in Council has been signed. The details are left to Deputy Minister of Naval Affairs J. G. Desbarats and to Admiral Kingsmill and the Naval Headquarters Staff to work out. The cost of the new scheme is estimated at about $200,000 per annum at first, and this amount will be inserted in the supplementary estimates for the present session. This will, it is expected, be sufficient to organize some twelve naval reserve companies of one hundred men each. There are to be three divisions: one for the Atlantic coast, with headquarters at Halifax; one for the Great Lakes, with headquarters probably at Toronto, and one for the Pacific coast, with headquarters at Esquimalt.

Men joining the reserve are to be given training in seamanship, boat drill, and other preliminary exercises calculated to make them available to supplement the requirements of the British navy in time of war. In the British navy it takes from three to seven years to train men and officers adoquately for active service. Consequently the training now contemplated in Canada will be very inadequate, but the Government thinks that it will at least be a first step in the right direction. It will also provide some work for the Niobe and the Rainbow as training ships during the annual drill season of the naval reservists. A period of twenty-one days' drill each year, under the instruction of officers to be furnished by the Naval Department here in co-operation with the British Admiralty, is contemplated.

To Start It This Summer.

It is expected that a start towards the development of the whole scheme will be made this summer, but it will take a year or so before the organization can be completed and anything like a moderately efficient naval reserve service in Canada can be built up. Meanwhile the Government is apparently going to leave its Dreadnought contribution policy quiescent.

CANADIAN LAKE VESSEL KEYNOR.

THE North of Ireland Shipbuilding Co. recently launched from their shipyard on the Foyle at Derry the Canadian Lake steamer Keynor, built to the order of the Keystone Transportation Co. of Montreal. The dimensions of the vessel are: Length 250 ft., breadth extreme, 42 ft. 6 in., and moulded depth 20 ft. She will have a draft in fresh water of 14 ft., and a deadweight-carrying capacity of about 2,300 tons.

Built to Lloyd's highest class for service on the St. Lawrence River and Great Lakes, her machinery has been constructed by J. G. Kincaid & Co., Greenock, and consists of triple-expansion engines supplied with steam from two single-ended boilers fitted with Howden's forced draught. She will have four special steam winches and a complete outfit of derricks, etc., for dealing with cargo, also powerful steam windlass, all made by Messrs. Clarke, Chapman & Co. A Wilson-Pirrie steam steering gear and electric light equipment throughout (the navigation lights, compasses and telegraphs being electrically lit), have been provided.

Very complete accommodations for the crew, as well as state rooms, and rooms for officers and deck hands, will be provided in the forecastle, with the captain's accommodation in a house on the deck above, the pilot house for navigating purposes being on top of the captain's quarters. The dining room, kitchen, pantry, cold store, engineers' rooms, and excellent accommodation for firemen, etc., will be provided in a large deck house at the after end of the vessel.

The Keynor has been built to the designs and under the supervision of John Reid & Co. of Glasgow and Montreal, the owners' naval architects.

CANADA'S ATLANTIC SEABOARD

Shipping and Shipbuilding Enterprises and Industries are Again in the Ascendency in Our Maritime Provinces, and Revival of the Old-Time Activity Appears Imminent

FITTING MEN FOR SEAFARING LIFE.

THE new school of navigation in connection with the N. S. Technical College has been opened and promises to be a valuable addition to educational facilities of the city of Halifax. Under the arrangement with the Marine Department, the latter provides the instructor, who is Captain Simmons, second officer of the D. G. S. Lady Laurier.

Capt. Simmons, who has had forty-six years' experience in marine matters, was for three years inspector of navigation in a marine school. He was born in Scotland, and got his early training as a navigator in schools there and in England. Since then he has had experience in all kinds of craft, sailing and steam.

A room in the Technical College building has been specially fitted up for the work of the school. The equipment includes compasses, sextants, barometers, chronometers, charts, drafting instruments, models for signalling and instruction on the rules of the road, etc. Instruction will be given morning, afternoon and evening, the latter only if sufficient men signify their intention of attending and state they cannot be present at day classes. There will be given in connection with the classes a special course in first aid work by a medical man. This will be under the direction of the St. John's Ambulance Association.

When students feel themselves qualified, they will take their examinations before Captain Malcolm, Examiner for Masters and Mates. The Captain will give lectures before the classes at the school, illustrated with the deviascope, the treating of the adjustment of ship's compasses, etc.

The purpose of the school is to train men so that they may qualify as masters and mates in the mercantile marine or in coasting vessels or in charge of boats on inland waters. The only expense to which students will be put will be in the purchase of books, no tuition fee being charged.

The local council of marine engineers hope to see the school extended so as to take in their branch of the mercantile service, and have petitioned the Marine and Fisheries Department to establish also a school in marine engineering at the Technical College, to be associated with the school of navigation. It is hoped that such a branch will open in the Autumn so that native born seafaring men may thus be furnished with the opportunity of qualifying for responsible positions in the mercantile marine. The conditions of instruction at the marine engineering school would be the same as at the school of navigation. There is at the college nearly all the apparatus that would be needed for engineering instruction, including boiler, engines, indicators, electric dynamos, etc.

AMENDMENT TO CANADA SHIPPING ACT.

AN important clause, dealing with the renewal of masters' and mates' certificates, is introduced in the proposed amendment to the Canada Shipping Act, which recently passed the first reading at Ottawa.

Clause 57 reads:—"A certificate of competency of service as master or mate other than for foreign-going or limited foreign-going ships, shall not be valid (a)—after the period of five years from its date, but a certificate may be renewed from time to time by an indorsement under the hand of the Minister or other proper officer of the department or by the grant of a new certificate, at the option of the Minister."

(2)—"Every certificate of competency or service as master or mate, other than for foreign-going ships, which at the commencement of this Act has been in force for five years or upwards, shall be void, unless renewed, as hereinbefore provided, within one year from the commencement of this Act."

(3)—"No certificate of competency or service, whether granted before or after the commencement of this Act, shall be renewed, unless the holder of the same at the time of renewal is a British subject."

This means that masters and mates will have to renew their certificates every five years, whereas, in the past, the certificates have held good for an indefinite period.

Certificates of Competency.

Dealing with grades of certificates of competency, Clause 39 reads:—

"Certificates of competency shall be granted to masters and mates in accordance with this for each of the following grades: —(a)—Foreign-going. (b)—Limited foreign-going. (c)—Coasting. (d)—Home trade. (e)—Inland waters. (f)—Minor waters.

(2)—"Those grades shall rank according to the order above stated, so that the holder of a certificate of any grade shall be entitled to all the rights and privileges of holders of certificates of lower grades."

(3)—"In the first three grades, certificates may be granted as follows: (a)—Ordinary, which shall entitle the holder to go in any ship. (b)—Certificates of fore-and-aft rigged ships only. (c)—certificates for steamships only."

(4)—"In the other grades, certificates may be granted for the following classes. (a)—Passenger steamship. (b)—Cargo steamship. (c)—Ferry steamship. (d)—Tugboat. (e)—Square-rigged sailing ship. (f)—Fore-and-aft-rigged sailing ship."

(5)—"Those classes shall rank according to the above order stated for steamships and sailing vessels respectively, so that the lawful holder of a steamship certificate shall be entitled to all the rights and privileges of a holder of a certificate in a lower class of steamships, and that the lawful holder of a certificate for square-rigged sailing ships shall be entitled to all the rights and privileges of a holder of a certificate for fore-and-aft-rigged sailing ships."

(6)—"The holders of sea-going certificates, issued before the commencement of this Act, shall be entitled upon surrender of the same to the Minister, to have issued to them foreign-going certificates under this Act."

Colors for Merchant Ships.

Clause 32, also new, reads: "The red ensign usually worn by British merchant ships, defaced with the Arms of Canada in the fly, is hereby declared to be the proper national colors for merchant ships registered in Canada, except in the case of any ship for the time being allowed to wear any other national colors in pursuance of a warrant from His Majesty the King, or from the Admiralty."

HALIFAX NO. 19 LIGHTSHIP WRECKED.

THE battered hulk of the new lightship, Halifax No. 19, was found among the breakers on Liscombe Island, five miles from the mainland, on May 23. She struck during the dense fog which had enshrouded the coast for several days, and it is believed her crew of 25 men are lost. Six bodies, wearing lifebelts, had been recovered up to dusk of May 23, by the steamer Dufferin. Both lifeboats, which the vessel carried,

were also found. A search of the little rocky islands in the vicinity was started in the hope that some of the crew may have been able to get through the surf alive. Word reached the Canadian Marine Department that the hull of the lightship was broken in two.

On Her Maiden Voyage.

The ship was on her maiden voyage from her builders' yards at Paisley, Scotland, to take up her station off Sambro Ledges, near Halifax harbor. The men were shipped in Glasgow. The Government steamers Stanley and Lady Laurier have been ordered to search for possible survivors or for more bodies.

Although the lightship was the last word in staunch steel construction and carried one 23-foot lifeboat and a powerful 24-foot motor launch, little hope is felt by the Canadian Marine Department that anyone on board escaped. Long rollers from the North Atlantic break over the jagged rocks with terrific force in the calmest weather. All vessels give the spot as wide berth as possible. The vessel coaled at St. John's, Nfld., and started from there on the last leg of what has proved a disastrous voyage on May 19.

An illustrated description of the ill-fated lightship appeared in our April issue.

400TH ANNIVERSARY OF TRINITY HOUSE.

THE 400th year of the foundation of Trinity House, the world-famous corporation of master mariners, chartered on May 20, 1514, by Henry VIII., was celebrated May 20.

At the time of its chartering the organization was described as "the guild or fraternity of the most glorious and undividable Trinity of St. Clement. Its founder was Sir Thomas Spent, Commander of the famous battleship Harry Grace de Dieu, and Comptroller of the Navy. At first it was mainly concerned with supplying pilots for the ships entering and leaving Deptford Royal Dockyard, but Henry VIII. increased its prestige by handing over to the corporation the direction of that dockyard.

Queen Elizabeth entrusted the corporation with what constitutes its chief modern duty by handing over to it authority to erect beacons and other marks for the guidance of navigators around the British coasts. These duties connected with pilotage, erection and maintenance of lighthouses, buoys and beacons, have been carried out by Trinity House ever since, and it has always led the world in the matter of coast lighting.

The history of Trinity House is the story of Britain's rise to the command of the seas, and the prestige of that country on the water is due in no small measure to the efforts of the ancient corporation. It was Trinity House which by by-law in 1687 made a written agreement between the master and crew of a ship compulsory.

The management of the corporation is in the hands of thirteen Elder Brethren, two of whom are elected by the navy, the remainder being appointed from the merchant service. Among the active and honorary Elder Brethren are the King, the Duke of Connaught, Premier Asquith and First Lord of the Admiralty Winston Churchill.

CANADA AND PANAMA CANAL.

IN a lecture before the Royal Colonial Institute on "The Economic Effect of the Panama Canal on Western Canada," Dr. F. B. Vrooman, a well-known British Columbian, said:—There are only two ports on the Pacific north of San Francisco that are in competition—the port of Seattle and the port of Vancouver. It is at this point that the whole matter becomes one of Imperial interest. The problem is whether the shuttlecocks of commerce are destined to pass backwards and forwards between the North American continent and the Pacific Ocean in its main bulk at least north of San Francisco, through the port of Seattle or the port of Vancouver.

Let it be remembered that not only has every great Canadian railway determined Vancouver for its terminal, but three great American railways also. Vancouver, therefore, is the only Pacific port of Canada which has or ever will have every great railroad coming to the North Pacific coast converging in one metropolis. Therefore this city is to be the metropolis of the British Empire on the Pacific Ocean, and nothing can ever stop it if the people of Vancouver exercise the same foresight and energy in the matter of their dock and harbor development that the people of Seattle are doing and have been doing for several years.

Sincennes-McNaughton Tugs.—A new tug which will be used in the harbor of Montreal has been laid down at the Sincennes-McNaughton snipyard at Sorel, and is expected to be ready for commission by the middle of August. She will be similar to the Aurelie G., which was brought out from England last year. Another new tug, also belonging to the Sincennes-McNaughton Company, has started running in the Lachine Canal service. The Edward G., as she is called, was built during the winter at Sorel by the company's shipbuilders, and is constructed entirely of oak.

MAKING HALIFAX A GREAT OCEAN PORT.

THE work now being undertaken at Halifax is only part of that which has followed the awakening of the Dominion to the fact that a complete internal transportation system must have a suitable point of contact with oversea transportation.

In its largeness of conception, the work at Halifax is greater than has heretofore entered anyone's mind with respect to the use of Halifax harbor. The hope of the Halifax merchant is that this great work is only a beginning; that it has, as it were, set a new habit of thought that will eventually be confirmed in a thoroughly comprehensive plan of every mile of waterfront on both sides of the harbor and that before long the foreshores and all their adjoining territory will be laid out and developed with a view to achieving the maximum efficiency of the port as a handler of freight of ocean-borne commerce, and under a harbor commission which will have full powers with respect to the planning of the waterfront and its approaches looking to the same harmonious development that is now being aimed at in the planning of European ports.

First Pier Being Built.

The first one of the six piers is now under construction, while the cutting is being excavated for the approaching right of way. The landing quay is to be a bulkhead of reinforced concrete construction and granite face. It will be 2,000 feet long with 45 feet of water at low water of spring tides, at which three of the largest vessels can dock in safety without the assistance of a tug. The whole length of this quay there will be a building, the first floor of which will be for freight and the second for passengers, custotms and immigration quarters. Passenger and freight tracks will run alongside the ships, and the whole scheme will be laid out so as to give the most expeditious, convenient and economical arrangements for the transfer of passengers, baggage, mails, and freight from ship to rail and vice versa.

Five Other Piers to Be Built.

The construction plans include six piers of the same permanent construction, of which two adjoining the landing quay are to be included, each 1,250 feet long and 300 feet wide. These will be equipped with wharfs, freight sheds and railway tracks. Altogether there will be berths for 32 steamers, and there will be the necessary accompaniment of shunting and storage yards, round house, elevator and an imposing union station. Altogether from end to end of the site of the new terminals, a mile and a half of water front will be covered.

GREAT LAKES AND ST. LAWRENCE

Water Transportation From the Atlantic to the Heart of Canada is one of the Live Issues of our Time and is Daily Becoming of Increased Importance

TO ELIMINATE ACCIDENTS.

ON the great lakes, the Lake Carriers' Association has conducted a systematic campaign for the elimination of the avoidable accident by distinctly marking dangerous places and by appointing safety committees from among the crew on each ship. In addition, the association has this spring begun a campaign on sanitation to promote the physical well-being of the men. A man is obviously not competent to do a day's work unless he is in good health.

The initial steps in the campaign have to do with the care and preparation of food supplies. Every dealer on the whole chain of lakes supplying meats, milk, groceries and ice to the boats has received a circular from the Welfare Plan Committee of the Lake Carriers' Association outlining certain simple rules to be observed in the care of foodstuffs. Meats are to be kept in the refrigerator away from flies and not exposed to handling by prospective customers. Milk must be pure, and cannot be transferred from one can to another until the cans have been thoroughly sterilized, and ice must under no circumstances come in contact with food. Manufactured ice is preferred, because, being made from distilled water, it is chemically pure, while natural ice may be of doubtful purity.

The observance of these rules will go a long way towards the elimination of typhoid fever cases, because typhoid is a disease which is communicated to the system through food and drink. In addition, the sanitary committee of the Lake Carriers' Association has defined the areas on the great lakes from which drinking water may be drawn for the vessels. It is known that practically all the water in the connecting rivers and for a distance from eight to twelve miles from the shore line of the larger cities is polluted. With pure food and pure water and absolute cleanliness aboard ship, there should be a distinct improvement in the morale of the lake fleet.

CANADIAN TENDERS TOO HIGH.

IN reply to a question by Mr. Lemieux, in the House of Commons recently, as to whether tenders had been asked from Canadian firms for the construction of new equipment recently secured in Great Britain by the Quebec Harbor Commissioners, Hon. J. D. Hazen stated that tenders had been asked from Mussens, Ltd., Montreal; Boose & Banks, Quebec; the Polson Iron Works, Toronto; Canadian Allis-Chalmers, Toronto; G. T. Davies, Levis; Canadian P. O. Mitchell Co., and the Collingwood Shipbuilding Co.

In reply to a like inquiry by Mr. Lemieux in regard to lightship, Halifax 19, built by Bow, McLachlan & Co., of Paisley, Scotland, Mr. Hazen stated that the lowest Canadian tender was that of the Polson Iron Works, Toronto, amounting to $159,750, as compared with the successful tender of $127,384.

MONTREAL HARBOR BOARD DELEGATION FINDINGS.

"I CAN assure you that we are all glad to get back to Montreal, and have a little rest after our strenuous three months' trip over European ports," said Mr. W. G. Ross, president of the Montreal Harbor Board, when he landed from the Laurentic.

Mr. Ross declared that although very interesting, it had been far from a pleasure trip. With Messrs. Cowie and Fennell he had thoroughly inspected some 25 of the more important ports, generally in miserable weather, while they had not only inspected the ports themselves, with their systems of handling traffic and general administration, but had also carefully examined their plans for future development. The main feature which struck the party was the immense expenditure being made on every side for the development of European ports, with the evidence that if Montreal was to hold its own, large sums would have to be spent on its development.

Provision for Canadian Products Abroad.

"At each port we visited," said Mr. Ross, "we made special efforts to secure the installation of facilities for the cheap and expeditious handling of Canadian products. The lessons we learned at Rotterdam, Hamburg and Antwerp were fully disclosed to the British port authorities, and the competition in Europe, as compared with the competition in Canada, for the transportation of Canadian products, was fully discussed. This has already resulted in a marked increase of interest in British ports regarding the necessity for providing modern facilities for the handling of Canadian products, especially grain."

Mr. Ross said that he and his associates were much impressed with the effective work being done by the Canadian Trade Commissioners they met in Great Britain and on the Continent, especially Messrs. Just and Lithgow, of Hamburg and Rotterdam.

Vast Plans Everywhere.

"At every port we visited," said Mr. Ross, "we found immense sums being spent on development work, and vast schemes being prepared for many years ahead. If Montreal is to hold its own in the race for the carrying trade, there is no doubt that a similar policy of improvement along the lines of a progressive programme for years to come must be followed. Extensive plans are already under way, and with the additional knowledge we have gained these will be enlarged upon, but there is no doubt that if Montreal is to keep its place among the world's great ports there must be very heavy expenditures within the next few years—Canada cannot afford to practise any false economy in this regard."

With regard to the tour, Mr. Ross said they began at the French ports of Havre and Marseilles, where the government and commercial bodies gave every facility for examination of both the ports and the commercial methods. Officials of La Compagnie General Transatlantique were much interested in Canadian development, stating that they intended to advance their Canadian service to Montreal as rapidly as the growth of business between the two countries would warrant.

Canal Through Mountain.

At Marseilles they found 113 ocean vessels in the port, which was a purely artificial one, on which immense sums had been expended, with gratifying results. An extraordinary feature of the development was the construction of a tunnel canal, which was being cut through the Rove Mountains in order to connect Marseilles harbor with the River Rhone navigation, which could be used for standard river barges, thus connecting Marseilles with the interior navigation of France.

The party found a tremendous development at Genoa, with direct services to South American ports. A complete new port was being constructed, with increased rail connections, and Mr. Ross said that again at Genoa he was impressed with the advantages to be gained by a direct service between Montreal, Genoa and Marseilles.

At Hamburg also, enormous improve-

ments and expenditures were going on, with the idea of keeping it one of the leading European ports. They found at Rotterdam that the increase in the importation of Canadian products had been so marked that they paid special attention to the facilities for handling and storing grain there.

The Canadian Trade Commissioner there, Mr. Lithgow, reported that the imports of Canadian grain to Rotterdam last year amounted to 16,000,000 bushels, double that of the previous year. They found it had a great advantage over other ports, since the flour mills were located right at the harbor, and had their own storage facilities.

Must Deepen St. Lawrence.

"From our observations," said Mr. Ross, "the St. Lawrence channel compares favorably with the approaches to Hamburg, Rotterdam and Antwerp, the three great North Sea ports, but we have come back convinced that the improvement and deepening of the channel between Montreal and Quebec should be pushed forward with all possible speed."

During their tour of the British ports, Mr. Ross said they were at first disappointed in comparing the progress made there with that at the continental ports, but this was to a large extent dissipated when they learned of the great improvement plans projected, including the construction of several new ports. "We saw signs of remarkable industrial expansion in England," said Mr. Ross. "There was no sign of any stoppage, and progress was evident everywhere."

LARGE MOTOR YACHT BUILDING.

AMONGST the larger new power yachts that will be in use along the Atlantic coast and the St. Lawrence this summer is one now in course of construction at the yards of George Lawley & Sons, Neponset, Mass., for Mr. J. K. L. Ross, of Montreal, from designs by Tams, Lemoine & Crane. This vessel, which has an over-all length of 106 feet, a water line length of 90 feet, 16 feet beam and 5 feet draught, will be launched early next month. She is equipped with two 200-horse power Winton motors, each having six cylinders, 9 x 14 inches. It is expected that she will be the fastest ocean-going vessel of her type yet built. She has a flush deck, and the boat equipment includes two launches, each with Winton motors.

A feature of the vessel is the headroom below decks, there being eight feet in all the living quarters. The accommodation includes three large staterooms and a bath aft. The engine room is amidships and separated from the rest of the vessel by watertight bulkheads. There are two complete six-cylindered Winton electric lighting motors, as well as the two 200-horse power motors in the engine room. The capacity of the fuel tanks is such as to insure success as a long distance ocean cruiser, for which use she is primarily intended. There is a large saloon forward of the motor room, with adjoining pantry and galley, while further forward are the large and airy quarters for the crew.

WHITE STAR LINE PROMOTION.

IN business circles generally, and in transportation activities particularly, the recent promotion of Mr. P. V. Mitchell to the position of manager of the Passenger Department of the White Star-Dominion Line has occasioned genuine pleasure, a wide circle of business and personal acquaintances appreciating in this promotion the recognition by the White Star Line of the splendid ability and the outstanding service rendered this great steamship organization by Mr. Mitchell.

It has always seemed entirely natural that Mr. Mitchell should follow a transportation career. His father was engaged in the same line of activity, having spent his entire business career until retirement a number of years ago in various official capacities with the Pennsylvania R. R. The son, like the father, has spent his whole business life in the service of one organization, completing twenty years of service with the company on April 3rd last.

In 1911 he was transferred from the New York to the Montreal office of the company to take charge of its rapidly extending cabin interests in Canada, and now with the retirement of Mr. R. F. Macfarlane he assumes full control of both the cabin and third class traffic controlled by the White Star Line in Canada. When it is recalled that this company, which operates in Canada as the White Star-Dominion Line, had directly and through various allied interests approximately 100 sailings from the St. Lawrence last year, it will be seen that it is easily our premier shipping concern.

Mr. Mitchell is an enthusiastic believer in the certainty of Canada's future and has no patience with the croakers who see nothing but blue ruin ahead of the country because business has suffered a temporary lull, which simply reflects like conditions elsewhere. He takes a very active interest in immigration matters and is a close student of all conditions affecting the annual ebb and flow of this class of traffic, which, as he rightly says, means so much to the future development and prosperity of the Dominion.

Mr. Mitchell was born thirty-eight years ago in New York, and entered upon his transportation career immediately following an educational course in both public and private schools.

ST. LAWRENCE RIVER UNUSUALLY LOW.

FOR this time of the year the water level in Montreal harbor is unusually low, and, as it is falling at the rate of about an inch a day, shipping men have some cause for anxiety. On May 21 the Harbor Commissioners' official gauge registered the depth as 32 feet 11 inches, which is over two feet lower than on the corresponding date of last year, and 3 feet 3 inches lower than on May 21, 1912.

It is a fact that for the last few years the level has been gradually dropping, which may be attributed to either one of the following causes:—Deforestation, the Chicago draining system diverting the flow of the St. Lawrence watershed down the Mississippi Valley, deepening of the channel, less rain or snowfall in the west or dryer springs.

Whilst there is no immediate cause for anxiety, the question naturally arises as to what depth of water there will be in the ship channel by the fall when the river is usually several feet lower than in the spring. With the river as low as it is at present, the fall will not have to be very great to affect the loading of the larger vessels coming to the port, as a shortness of water will not permit of them carrying heavy cargoes and consequently drawing their full depth of water. Several days' rain would be welcomed now by the authorities looking after the depth of the river channel.

ABSENCE OF LIGHTSHIP AT THE LOWER TRAVERSE.

AFTER the Wreck Commissioner had given the decision of the court regarding the accidents to the Saturnia and Montfort, Mr. Meredith said he did not wish to discuss the judgments, nor whether the absence of lights had anything to do with these two casualties; "but," said Mr. Meredith, "I appear for the Shipping Federation of Canada and the Canadian Pacific Railway, both of whom are tremendously interested in the St. Lawrence navigation, and, as no mention has been made in either judgment of the absence of lightships from their stations, I am instructed to ask you to bring the evidence in this regard before the Minister. This is with the object that in future years there may not be a position where we find ocean steamers reported coming into the Gulf and no lightships sent down in proper time, especially to what is regarded as one of the most dangerous spots in the channel, the Lower Traverse.

Department Negligent.

"I do not want to criticise the Government or the department," said Mr. Meredith, "but in the interests of the

country, the St. Lawrence route, the shipping companies and the underwriters it is absolutely necessary that safeguards to St. Lawrence navigation should be in position at the time when they are most needed, when the first vessels are coming up. I, therefore, ask that the evidence in this connection be sent to the Minister, in order to make him aware of the position, so that it may not occur again."

If this lightship at the Lower Traverse were necessary, as he was advised it was, then it should be sent there during the full season of navigation, especially at the opening, when the danger was greatest; but the evidence showed that departmental officers knew that steamers of great value, with heavy cargoes, passengers and crews, were coming up, but they took no steps to hasten the lightship to her position. Although they could have got the Government steamer Druid or the Strathcona to tow her up, they sent her up under her own steam, knowing she could not get there in time. Had she been towed, she could have reached the Lower Traverse before any ocean vessels came up. She was not, however, and did not reach her position until after they had passed. All the talk about a frozen rudder is absolute rubbish," said Mr. Meredith, "because the captain of the Druid said he could have towed the lightship down in six hours, ample time to have met any incoming liners."

Further, Mr. Meredith said he was advised by experts that instead of a lightship where the Arctic was placed at the Lower Traverse there should be a pier, and he asked that his representations in this behalf be conveyed to Hon. Mr. Hazen, on behalf of the Shipping Federation and the Canadian Pacific.

The New Wreck Commissioner.

"With regard to your own position as Wreck Commissioner," said Mr. Meredith, "I understand that your future appointment to take charge of the Quebec Pilotage has been confirmed. I, therefore, submit that whoever may be chosen to replace you should not be an official of the Department of Marine and Fisheries, where he might be under the necessity of judging upon his own colleagues, but preferably an official of the Department of Justice. This would be in conformity with British practice, and also leave the Wreck Commissioner free of the inconveniences and possible suspicions that might attach to his work as long as he is an official of the Marine Department.

"It is absolutely wrong that a Wreck Commissioner should be put in a position where he may have to decide some important question, perhaps condemning some of his departmental colleagues, and then have to return to Ottawa, and perhaps defend his work to them. Such an official should be placed in an entirely outside position by being attached to another department."

Commander Lindsay assured Mr. Meredith that a memorandum would be drawn up with extracts from the evidence in the cases of the Montfort and Saturnia, with regard to aids to navigation, for presentation to the Minister of Marine and Fisheries, and also covering the representations made by Mr. Meredith on behalf of the shipping companies.

INLAND MARINE INTERESTS OPPOSE RAILWAY COMMISSION JURISDICTION.

THAT the Canadian marine interests on inland waters are strongly opposed to being brought under the jurisdiction of the Railway Commission, with their rates subject to its approval, was very clearly brought out before the joint commission investigating the new Railway Act at its sitting on May 19. A deputation representing several of the large Canadian companies were present, and the evidence they gave was of an interesting character. The situation as developed is that tariffs of vessels owned by railways are under the control of the board, but no others. Mr. J. E. Armstrong, of East Lambton, has been pressing in Parliament for some time for legislation that would bring all vessels plying the inland waters under such control, and in the revised consolidated Act this is included.

Expressions of Opinion.

Mr. Lawrence Henderson, managing director of the Montreal Transportation Co., was the chief speaker of the morning. He declared most emphatically his opposition to any further restriction on inland navigation interests. Flexibility of rates was an essential to competition, he said. It was not the vessel owners who made the rates, but the shippers. Rates were regulated by natural laws which legislation could not control properly. A few minutes' time would often change the whole situation. He thought that the proposed legislation would work only to the benefit of the lake and rail lines, and would be an actual detriment to shipping generally. It would put small lines out of business, concentrate it in the hands of large companies and probably tend to divert trade to the United States. He believed it would mean a raising instead of a lowering of rates.

Mr. Henderson gave some interesting testimony with regard to the possibility of greater diversion of Canadian grain to the port of Buffalo. He believed that Canadian vessels were to-day getting all the traffic that the port of Montreal could handle. Greater facilities at Montreal and more tonnage at that port were needed. If there was double the tonnage out of Montreal there could be twice as much grain brought there by the lakes. Under conditions as now existing he thought that five cents a bushel from Fort William to Montreal was a fair rate. Two cents a bushel was a killing rate.

H. W. Richardson, of James Richardson & Sons, Kingston, was next heard. He pointed out the great need of constantly improving the terminal facilities at Canadian ports. The American boats had been engaged during the summer months for ore cargoes up and coal cargoes down. Canadian boats often had to go light. He referred to the fact that the Erie Canal would be open in 1916, and that this would tend to make a low rate between Buffalo and New York. The effect of this could not yet be determined. The deepening of the Welland Canal would offset this, however, and might give Canada a real advantage. He scouted the idea that American boats would use the Welland Canal to go to Oswego with their cargoes. They would be going over 100 miles to save but 40 miles, he pointed out.

He declared that the improvement of waterways had steadily lowered rates. In early days he had paid 25 cents a bushel on corn between Chicago and Kingston. When the Welland Canal was deepened to 14 feet the rate dropped to four and five cents a bushel. With further deepening of this canal he thought there would be further saving.

Other vessel men in attendance were A. A. Wright, manager of the St. Lawrence-Chicago Steamship Co., of Toronto; G. B. Harriss, of the Canadian Steamship Co., and Denis Murphy, of the Ottawa Transportation Co.

MONTREAL BOARD OF TRADE LIKES PILOT BILL.

CONSIDERABLE satisfaction was expressed by the Council of the Montreal Board of Trade at a recent meeting that the Dominion Government had finally acceded, at least in part, to its long-continued requests for the abolition of the Corporation of Pilots for and below the harbor of Quebec. A copy of the new Pilotage Bill was sent to the Council by the Department of Marine and Fisheries. It was considered that this bill to a large extent met the ideas of the council, which had been at various times presented to the Department since April, 1913, and much pleasure was expressed at its provisions. It was ordered that the Board's thanks be conveyed to Hon. Mr. Hazen for the action he had taken in this regard; with an expression of the hope that the bill might speedily become law.

PILOTS SUSPENDED FOR VESSEL MISHAPS.

IN his judgments on the grounding in the St. Lawrence of the Donaldson liner Saturnia in the Lower Traverse and the Montfort, of the C. P. R. steamships, Commander H. St. George Lindsay, Dominion Wreck Commissioner, finds that the pilots of these vessels were altogether to blame. The two Quebec pilots, Lachance and Gourdeau, were, therefore, found wanting in ordinary skill and good judgment, and both had their licenses suspended for three months.

In addition, the captain of the Saturnia, David Taylor, was censured by the Wreck Commissioner's court for not being on deck to look after things when he knew the risks of the narrow channels. In contradistinction to this the master of the C.P.R. liner Montfort was commended by the court for taking control of his vessel out of the hands of the pilot when he found the latter incompetent, although he unfortunately had not taken this drastic step until it was too late to prevent the vessel from grounding.

Commander Henry St. George Lindsay, R.D., R.N.R., Dominion Wreck Commissioner, presided, assisted by Mr. Francis Nash and Captain J. O. Grey as assessors. Mr. F. E. Meredith appeared for the Shipping Federation, and Mr. Walter S. Johnson, of Heneker & Johnson, for the officers of the Montfort, while Mr. Thos. Robb, secretary of the Shipping Federation, was also in attendance.

Without losing any time, Commander Lindsay read the unanimous judgments of the Wreck Commissioners' court. First came that concerning the Saturnia. The judgment set forth that this vessel seemed to have been well found and equipped in every respect, and came to Canadian waters with 300 passengers and a crew of 148. At Father Point she was boarded, in April 27th, at 9.24 p.m., by Jules Lachance, a special Quebec pilot, and proceeded towards Quebec.

Left Pilot in Charge.

For a time all went well, the judgment continues. the weather being clear and fine. The pilot told the master of the ship that as the Lower Traverse light was not in place he intended to wait for daylight before taking the ship through that channel, to which the master agreed, and shortly afterwards left the deck, leaving the pilot in charge.

Coming to the actual grounding, the judgment continues: "At 4.18 a.m. the engines were ordered full speed ahead by the pilot, and the vessel proceeded toward the Lower Traverse. The tide being full and running strong, the vessel's speed must have been approximately from 18 to 19 knots over the ground. At 4.40 a.m. the vessel touched the ground. She did not stop, and it was found shortly after the stranding that Nos. 6 and 7 ballast tanks were leaking." In dry dock later at Montreal it was found that temporary repairs had to be made to her bottom plates, while several blades of the propellers were bent.

In his finding Capt. Lindsay considers that it was caused "by the action of Jules Lachance, the pilot, inasmuch as he appears to have had no confidence in himself as to the manner of navigating the vessel through this channel, and apparently did not make use of the usual day marks for safe navigation. The court, therefore, considers that the pilot did not show either ordinary skill or good judgment in attempting to pass through the Lower Traverse channel under existing conditions, and, therefore, suspends the license of Jules Lachance, the pilot, for a period of three months from this date."

With regard to the captain of the vessel, the court found that, knowing that the Lower Traverse Lightship was not at her station, and the risks of navigation in such narrow channels with a strong flood tide, he ought to have been on deck, and, therefore, censured him for negligence.

The fact that the lightship was not in position was considered as not important, since the vessel had passed its location before the grounding occurred, and, if it had been considered necessary for safe navigation, both master and pilot had taken undue risks in trying to navigate the Lower Traverse knowing the lightship was not there.

Pilot Entirely to Blame.

With regard to the grounding of the C.P.R. liner Montfort on the Beauport Bank, 2½ miles below Quebec, early April 28, the court also found that Pilot Francois Goudreau was entirely to blame, at the same time commending the master for taking his vessel out of the control of an incompetent pilot, although he unfortunately delayed this action until the ship was almost ashore.

In opening his judgment, Commander Lindsay showed that the Montfort sailed from Antwerp for Montreal with 162 passengers, 95 crew, and general cargo, and was apparently well found and equipped. Pilot Goudreau was taken on at Father Point. Everything went well until the morning of the grounding, April 28th.

As to this the judgment continues: "At 8.19 the speed was reduced to half speed and at 8.22 to slow. Shortly after this the vessel ran into a dense fog, and, thinking she was too near the Levis shore, on account of hearing the noise of riveting machines, the pilot gave orders to port the helm, which was done." At this time the lead showed 4½ fathoms, and before another sounding could be taken the Montfort was stranded on the Beauport Bank, where she stuck until assisted off on the 29th, without having sustained any apparent injury. It would appear," says the judgment, "that about the time the vessel stranded the master superseded the pilot in the management of the ship, as he saw that the latter had apparently become bewildered as to the ship's position.

"The court is unanimous in its opinion that the stranding of the Montfort was caused entirely by the want of skill and poor judgment displayed by Pilot Goudreau, inasmuch as he appears to have lost all knowledge of the position of the vessel after entering the fog; and the court considers that his local knowledge and knowledge of the tides and ice movement should have prompted him to do the only proper thing possible in the circumstances, and to anchor until he found his actual position." Pilot Goudreau's license was, therefore, also canceled for three calendar months.

Justified Captain's Act.

The judgment continues: "No blame in the opinion of this court can attach to the master or officers of the Montfort, as everything appears to have been done by them to assist in the proper navigation of the vessel. This court considers that the master was perfectly justified in taking the ship out of the hands of the pilot, although unfortunately not in time to prevent the stranding, and commends him for his action."

Again, in this case, the Wreck Commissioner's court expressed the opinion that the fact that all the aids to navigation were not in place had no material bearing on the stranding.

Submarine Bells.—Submarine bells are now in operation at Point Grey and Gossip Reef. The work of placing these modern aids to navigation was entrusted to the Quadra and has been put through with dispatch. These submarine bells will be operated in connection with the bell buoys and beacons established at the above points. Another submarine bell has yet to be established, and it is understood that one will be placed off Cape Beale, B.C.

Toronto Harbor Improvement.—The big dredge "Schumiah" has arrived in Toronto harbor, having been towed from Port Arthur, Ont., and the Canadian Stewart Co. expect to commence operations upon the filling in of Ashbridge's Bay. Two other dredges are being built for the company at the Polson Iron-works, and one of these will be ready shortly.

PACIFIC COAST DEVELOPMENTS

Featuring the Record of Progress and Dealing With the Steps Being Taken to Stimulate and Enlarge the Already Established Shipping and Shipbuilding Enterprises

VANCOUVER SHIPMASTERS' ASSOCIATION.

AT a meeting of the Vancouver Shipmasters' Association held recently, Deputy Minister of Marine Johnstone came in for some severe criticism over the reply he has forwarded regarding the appointment of a royal commission to investigate coastwise shipping conditions. The gist of his answer to the request sent to Ottawa for a commission was that the matter had been turned over to the commissioner of customs to deal with. Mr. H. H. Stevens, M. P., has been asked by the association to wait on the deputy-minister and inform him that such evasiveness prompts them to remind him that neither he nor the commissioner of customs has the authority to any degree to undertake to alter or amend the shipping laws of Canada.

The present deputy minister championed the cause of Norwegian vessel owners in the coastwise trade of Eastern Canada, an action which cost him his seat in 1908. A question of such vital importance, the association feels, should be thrown open for discussion on the floor of the House and not sidetracked in such a manner. The Vancouver shipmasters have been asked by those of Eastern Canada to extend their co-operation in opposing the renewal of this Order-in-Council permitting vessels flying a foreign flag to trade along the Canadian coast.

The Order-in-Council under which foreigners are allowed to operate in the coastwise trade continues effective—unless rescinded—until December, 1915, and the vessels may be up to 2,000 tons gross tonnage, an increase of 500 tons over the limit specified in the previous order-in-council.

The meeting also decided to word a letter, enlarging on the many advantages of Burrard Inlet over the Fraser as a situation for the terminal grain elevators. This will be forwarded to the grain commission which sits in Winnipeg next month.

WORKING MODEL OF PANAMA CANAL.

IN order to give a bird'e-eye view of the Panama Canal, the largest model in the world has been constructed for the Anglo-American Exposition being held at the White City, Shepherd's Bush, London, England, this month. Every detail of this fifty-mile canal and the surrounding hilly country will be faithfully reproduced from official drawings, diagrams and maps. Authorities actually engaged in making the canal are attending to the modeling, and the working parts have been made in the United States.

Vessels will travel up and down the 200 feet of waterway, and the locks will be operated to demonstrate how steamers are raised to various levels. Hauling locomotives and passenger trains will work on the banks, and at night the dozens of lighthouses, buoys and beacons will be illuminated. To the extent of over 25 feet on either side of the canal the Panama Zone will be depicted in order to help visitors to realize the magnitude of the undertaking.

The model will be in the American Section of the Industrial Halls, and there will be no charge for viewing the scene from raised platforms. Lecturers will explain the working of the waterway, and a collection of pictures showing the progress of the construction and illustrating the almost insuperable difficulties of the engineers have been lent by the United States Government.

C.P.R. PACIFIC COAST SERVICES.

INAUGURATING the C.P.R. summer tours to Alaska from Victoria and Vancouver, the steamer Princess Alice will sail from Victoria on June 26. The Princess Alice will make four round trips in the Northern British Columbia and Alaska service, sailing from Victoria on June 26, July 10, July 24, and August 7. As previously announced, the C.P.R. has, owing to the constantly-increasing summer tourist travel to Alaska, decided to augment its Alaska service this year by placing on the route the steamer Princess Alice.

The Princess Alice is one of the most recent additions to the well-known coast fleet operated by the C. P. R., having been built in 1912. She was brought out to the North Pacific Coast via the Straits of Magellan, and has since been operating between Victoria and Vancouver. This vessel is well adapted for the Northern trade, being constructed of steel throughout, with cellular double-bottom, seven watertight transverse compartments and two watertight flats, rendering her practically unsinkable. Apart from the operation of the Princess Alice, the C. P. R. will also maintain regular sailings to Alaska ports with the coastal steamers Princess May and Princess Sophia.

Sailings for Skagway will be weekly during the summer months. Effective on and after Friday, June 5, steamers will leave Victoria at 11 p.m. every Friday, and Vancouver at 11 p.m. every Saturday, arriving at Skagway at 7 p.m. Thursdays, Alaska time.

Features of the Alaska Route.

While the regular steamers will operate as usual to Skagway via ports, the Princess Alice will include in her itinerary all the scenic points of interest in Alaska. The Alaska trip of the B.C. Coast Service covers a journey through the "Norway of America," and for scenic grandeur and interest there is nothing in the world to equal it. The grandest scenery in the world is available to the tourist without sacrificing any of the comforts of a twentieth-century hotel.

After leaving Victoria and Vancouver the first stop is Alert Bay, where is to be found one of the quaintest Indian settlements on the Pacific Coast. Leaving Alert Bay, the tourist is carried across the Queen Charlotte Sound, the largest open body of water passed on the entire trip, which is negotiated in three hours. Then the course lies through smooth waters among myriad islands, past Swanson Bay and through the lovely Grenville Channel across the mouth of the famous Skeena River. A passing call is made at Prince Rupert and Port Simpson, and then the steamer is headed for Ketchican, the first Alaskan port.

A course is then set through the Clarence Strait, and, passing the famous Prince of Wales Island, the tourist gets the first glimpse of the Alaskan glaciers. Leaving Wrangel and passing through Wrangel Narrows, the steamer goes through narrow and tortuous channels, and later on enters Frederick Sound and Stephens Passage.

During the summer season the Princess steamers pay a visit to the famous Taku Glacier, which is off Stephens Passage, and extends for well over one hundred miles to Atlin Lake, in Northern British Columbia. Glacier after glacier succeed each other until Gastineau Channel is reached. Treadwell, the big mining centre, is touched at, and subsequently the vessel calls at Juneau. Leaving Juneau, the steamer passes northward through the Lynn Canal to Skagway. Here is the southern terminus of the White Pass & Yukon Route Railway, which operates 110 miles to Whitehorse, and communication is given with Dawson by stern-wheel steamers plying the Yukon River.

250 H.P. MOTOR YACHT.

A TWIN-SCREW motor yacht of handsome appearance has recently been designed for a British Columbia yachtsman by Mr. W. G. McBryde, of Tynemouth. She is to be used for cruising on the Pacific coast, and the owner's requirements were for a fast, seaworthy craft, with ample deck space, and good accommodation below decks. The principal dimensions are as follows:—

Length overall, 100 ft.; breadth, 16 ft.; draught, 6 ft. aft. The hull will be of the best quality construction and finish. The keel, stem, and sternpost are of oak, frames of selected white oak cut out of natural grain timber, outside planking of pine, 2¼ in. thick, deck beams and stringers of oak, deck planking of selected yellow pine, 2¼ in. thick, and all fastenings of copper and bronze. The sides of the vessel amidships for a length of about 47 feet are carried up and connected with a flush bridge deck. Aft of this for a distance of 14 ft. is a teak cabin trunk or skylight, 2 ft. 6 ins. in height, with two plate-glass windows on each side, which hinge up inside and afford good lighting and ventilating facilities. The deck aft of the cabin trunk is flush. A fore deck of about 28 ft. in length is provided, and is raised about 18 ins. above the sheer line.

Crew Accommodation.

Below deck the following accommodation is to be found:—

The space abaft the collision bulkhead is occupied by the crew, and is fitted with four cots, seats, lockers, etc. The access to crew space is through a hatch on deck. Immediately abaft this is the captain's and engineer's room on the port side, fitted with two bunks, wardrobe, desk, seat and folding lavatory. A mess room for the crew occupies the space on the starboard side opposite the captain's room, and is fitted with settees and dining table. Entrance to the galley and pantry is from a passage through the mess room. The galley is fitted with a large coal and wood range, coal box, dresser, and shelves for the usual cooking utensils. The pantry is on the port side and is entered from the galley, a lift being fitted from the pantry to the saloon above. A dresser, sink and cupboards are fitted, and a large ice box and store room are connected with the pantry and galley. All the foregoing compartments will be finished in white enamel, with the exception of the galley.

Engine Room Feature.

The engine-room is amidships, and is about 19 ft. in length. At each end of this space is a steel watertight bulkhead, with access to the engine-room only from the deck above. Fuel tanks containing about 2,000 gallons are placed in the after-end of the engine space; work bench, seats, and lockers are also fitted, together with compressed air tanks.

The propelling machinery consists of twin six-cylinder 125 h.p. heavy-duty motors running on "distillate." Specially designed manganese bronze propellers will be fitted, giving a speed of 13.9 knots.

Owner's Accommodation.

The owner's room is located abaft the machinery space, occupying the full width of the vessel, with a length of 8 ft., and fittted with a double bed and drawers, settee, two wardrobes, large dressing table with mirror, also a writing desk. Ample light and ventilation are obtained from four port lights and skylight above. The partitions and furniture are finished in polished mahogany, the ceiling being enamelled white and gold lined. A bathroom is located on the starboard side, and is entered from the owner's room or passage, and fitted with bath, w.c., wash basin, and linen locker. The plumbing will be of the latest type with nickle plated mountings and fixtures, the bathroom being ventilated through two ports and skylight. A single stateroom occupies the space on the port side, and is fitted with bed and drawers, etc. The owner's quarters are entered through a private companion ladder from the bridge deck.

Abaft this, the accommodation consists of three single-berth state-rooms, and one double-berth state-room and bathroom, access to these rooms being from the passage and stairway leading to deck. The state rooms are fitted with bed and drawers, dressing table, wardrobe, and settees, all of which will have mahogany fronts; partitions and ceiling will be enamelled white. A large teakwood dining saloon is fitted at the fore end of the bridge deck, 18 ft. in length, with an average width of 9 ft. 6 ins. There is a stairway leading on to the deck.

The vessel has two pole masts of Oregon pine; sails will also be provided for use in case of emergency. Electric light will be fitted throughout, a separate lighting plant being installed in the engine room, while a searchlight is fitted on the bridge. Two boats will be carried, an 18-ft. motor launch and a 14-ft. dinghy. With the exception of the funnel, the vessel is very attractive in profile.—Motor Ship.

Latest in Deck Seats.—A life-saving appliance which possesses many points of interest is the MacTavish patent automatic buoyant deck seat. Not the least of its advantages in case of emergency lies in the claim that the moment it is water-borne it opens of its own accord and is transformed into a raft capable of supporting 22 persons.

WOMAN SEA CAPTAIN.

MME. BAUDING, the wife of a ship's doctor, has been appointed captain of a Transatlantic steamship. This is the first time that a woman has been given such a position of responsibility on a modern vessel of any importance.

The new ship's commander got her taste for things nautical from accompanying her husband on all his journeyings. Only a year ago she proved her capabilities by taking over the navigation of the ship on which she was traveling in the Baltic when the captain fell seriously ill. The crew were at first somewhat disgusted at having to obey a woman, but when she showed what a thorough seaman she was, they quickly became her devoted admirers, and her orders were obeyed with the precision of clockwork.

The Biggest Ever.—It is intended to build a steamship at Belfast which will eclipse in size and tonnage either the Vaterland or her sister ship now being built in Germany. Lord Pirie and the Belfast Harbor Commissioners have arrived at an understanding regarding the dredging of Belfast Lough channel to a considerable additional depth, and at an early date the vessel, which is to be one of 60,000 tons, will be under construction. The tonnages of the five largest existing liners, those of the Britannic and Vaterland being approximate, are as follows:—

	Tons gross.
Hamburg-American Vaterland	58,000
Do. Imperator	52,171
White Star Britannic	50,000
Cunard Aquitania	47,000
White Star Olympic	46,359

New Light Installed.—A vapor light which had been installed by the Department of Marine and Fisheries at Ile Ronde, St. Lawrence River, Montreal, is now in operation. The innovation is an improvement on the old light, the range being much farther and the glare incomparably brighter, and thus easily distinguishable in the blur caused by all the electric lights of the city, which at times was not the case with the old range light. The new installation is an oil lamp operated by air, forming a vapor which when ignited gives a very powerful and white illumination. A clock arrangement regulates the flow of gas, which must necessarily be kept always constant. Up till recently there were only four of these vapor lights in this district and the fifth at Ile Ronde is an improvement on the others, though similar in design.

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PRINCIPAL CONTENTS.

AN EPIDEMIC OF DISASTERS.

IT must be apparent to even the most casual and least thoughtful observer that the 1914 record of disasters to shipping on our eastern shores is assuming altogether in number and seriousness unreasonable and quite unnecessary proportions relatively. The untoward tragedy which befell our sealing fleet and desolated so many homes was quickly followed by numerous vessel strandings and mishaps with the dawn of another navigation season on the St. Lawrence, and as if the exaction of men's lives and the whole or partial destruction of their material creations were tributary to progress, another marine tragedy marks the closing days of this month of May.

Lightship, Halifax, No. 19, a new vessel built in that same cradle, the River Clyde, from which almost numberless craft of every size and kind and on every sea have been given birth, has been wrecked on our inhospitable eastern seaboard, and with her, so far as is known at time of writing, the lives of the whole crew have been sacrificed. In all of this brief season's happenings, or for that matter, any other season, unseaworthiness has seldom or ever been imputed; in spite of this, however, the disagreeable record of waste goes on. It would seem, therefore, that the personal element is the culprit, and in a particular direction.

Incapacity has figured largely in many of the shipping disasters at our doors and is still contributory but, thanks to the insistence of our combined shipping and commercial interests, a remedy has been evolved, and its application in the future will do much to heal what have previously been open sores. A further remedy and one perhaps harder of application than that above referred to is the instilling into the minds of men who are responsible for the navigation of the ships that frequent or perform service on our shores, lake, river and ocean, the duty they owe to civilization and to themselves as individuals, and to those directly committed to their care.

In every sphere of activity, yes, of inactivity if you like, the tendency to-day is to take chances, and it is regrettable to find that much of the possible outcome of these is lightly apprehended. The approach to our eastern seaboard is indeed inhospitable and the waterway to our Metropolis from the Atlantic is only a picnic when the traveler realizes that in addition to being aboard a staunch and well-found ship, there is a man in supreme charge whose motto is "Safety First," and from whom an atmosphere of similar intent radiates to his subordinates.

Much publicity is being given the subject of **The Unsinkable Ship**, and much ingenuity is being expended to compass the reality, but so long as those in charge deem themselves free to take chances, and rely on their capability, and it may be previously emblemished record "to see the thing through," depend upon it that the unsinkable ship will be a myth, and the roll of tragedy and disaster will be unceasing in its occurrence. Men forget that, the driving of a vessel at full speed through a fog or through an iceberg-studded sea, or that excessive self-reliance when off a treacherous coast are in no sense marks of ability, and that such exercises are credited at their true value by a critical public opinion. The bringing of a vessel safely to port has indeed become so commonplace as to be hardly noticed, much less appreciated, yet the apparent monotony of the procedure in all seasons and through all weathers is the spice of variety in the opposite direction to dare-devil recklessness.

The approaches to our Atlantic seaboard, through the Gulf and up the St. Lawrence to Montreal would have a less harrowing tale of tragedy and disaster to their record, if less were said concerning their safety. The latter has a tendency to create a somewhat relaxed carefulness and, while needless of course to placard the dangers the world ever, it should be seen that these were not in any way minimized to and appreciated by those whose vocation necessitated their observation.

Marine News From Every Source

Ottawa, Ont.—A bill has been passed authorizing a loan of $9,000,000 to the Montreal Harbor Commission for improvements to the port.

The Great Lakes Dredging Co., Ltd., and several other companies controlled by Mr. James Whalen, have occuped offices in the new Whalen Block, Port Arthur, Ont.

John Martin, freight manager of the Allan Line at Liverpool, is retiring through failing health. His experience in freight traffic in England and Canada goes back fifty years.

Customs Cruiser Margaret.—The new Customs cruiser Margaret sailed from Halifax on May 16 for Quebec, where she will enter the St. Lawrence revenue service. She is commanded by Captain May.

Commander Henry St. George Lindsay, R.D., R.N.R., has been appointed to take charge of the Pilotage District of Quebec, and he expects to leave to undertake that office about the middle of June.

Collingwood, Ont.—The steel scow recently built by the Collingwood Shipbuilding Co. for the Boone Dredging Co. was launched on May 11 into Drydock No. 1, and is now receiving her finishing touches.

Fort William, Ont.—T. Duff Smith, general fuel agent for the G.T.P. Railway, states that the contract for the new $1,250,000 coal dock, which the railway intends to erect at the mouth of the Mission River, had been let to the Thunder Bay Contracting Co.

The Polson Dry Dock and Shipbuilding Co., Ltd., has been incorporated, with a capital stock of $2,000,000 and head office in Toronto. The company is empowered to do a general shipbuilding business, dredging, the construction of public and private works, etc.

Collingwood, Ont.—The two bucket dredges recently built by the Collingwood Shipbuilding Co. for the Dominion Department of Marine and Fisheries left on May 9 on their initial trip to the lower St. Lawrence, in charge of Captains Joseph Delaney and John Mawdesley.

Port McNicoll, Ont.—The steamer Sheldon Parks, carrying 360,000 bushels of wheat, was unloaded at Port McNicoll elevator in twelve hours, being at the rate of 30,000 bushels per hour. This record has not been surpassed by any elevator on the Georgian Bay or Lake Huron.

Big British Vessel Merger Completed. Arrangements were completed on May 22 for the amalgamation of the Peninsular and Oriental Steamship Co. and the British India Steam Navigation Co., two of the most important British shipping concerns, with a capital of over $40,000,000.

Tide Tables for the Pacific and eastern coasts of Canada for 1914 have been issued by the Tidal and Current Survey in the Department of the Naval Service of the Dominion. The bulletins contain tide tables for various points on each coast, and in addition a considerable amount of information on tides and currents.

Owen Sound, Ont.—It is expected that the Northern Navigation Co.'s new steamer Noronic will go into commission next month, and General Manager H. H. Gildersleeve has announced the following officers to the command:—Captain, R. D. Foote; chief engineer, S. Brisbin; steward, T. Hunter; purser, H. R. Storey.

Captain Dion, of the steamer Champion, dropped dead on board his vessel on May 21. The steamer was on the way from St. Michael to Quebec, and stopped at St. John, Isle of Orleans. Deceased went into his room and just as he passed the door, fell to the floor and expired. He was about fifty years of age, and leaves a wife and family.

Sault Ste. Marie, Ont.—It is understood that the Lake Superior Dry Dock & Construction Co., Ltd., which has been granted a subsidy by this city and by the Dominion Government, has contracted with the British Construction Co., London, England, for the building of its plant. Work is to begin on the proposed drydock during the present month.

Goderich, Ont.—The first part of the new foghorn arrived recently in the shape of a large cylinder, 16 feet long and 3 feet in diameter, to hold the compressed air which will be supplied by an electrical pump. The new horn, which is supposed to be the loudest and most powerful on the lakes, will be placed on the south end of the north outside breakwater.

Founded 400 Years Ago.—The 400th year of the foundation of Trinity House, the world-famous corporation of Master Mariners, chartered on May 20, 1514, by Henry VIII, was celebrated in London (England) on May 20. The history of Trinity House is the story of Britain's rise to the command of the seas, and her prestige on the water is due in no small measure to the efforts of the ancient corporation.

Victoria, B.C.—J. H. Parks, representing the firm of Parks, Tupper & Kirkpatrick, contractors for the new Marine and Fisheries wharf, is completing arrangements for an immediate start on the work. The contract calls for the erection of a creosoted pile wharf, over 600 feet in length and 50 feet in width, and the excavation and leveling off of approximately 27,000 cubic yards of material.

Drydock Subsidies. — Hon. Robert Rogers has given notice of a resolution to provide for an increase in the subsidy by the Government to encourage the construction of drydocks of the first class. The present Act provides for a subsidy of 3½ per cent. per annum of the cost of the drydocks for 35 years, where the expenditure is over $1,000,000. It is now proposed to increase the subsidy to 4 per cent. per annum.

St. Catharines, Ont. — The steamer John Duncan, of the Canada Cement Co., while passing up the canal on May 4, rammed the gates of lock 5, and again those of lock 10, similarly to the manner in which the Compton struck the gates at lock 4, but not with the same disastrous result. At lock 10 the gates were opened about two inches, but as both locks were equipped with the Gowan safety device, no damage was done.

Owen Sound, Ont.—Mayor McQuaker on May 5, signed an agreement for a

drydock and shipbuilding concern. The town is to give a bonus of $10,000 per year for 20 years, also exemption from taxes, excepting school taxes, for ten years. In return, the new concern is to construct a plant valued at $1,500,000 and to give employment to at least 200 men all the year round. English capital is behind the project. A by-law will be submitted at an early date.

Montreal, Que.—A new lighthouse is being built on the St. Laurent wharf and will be in operation about June 1. It will replace the fixed white light shown from a lantern on the freight shed and will be placed on the wharf near the outer end and behind the shed. It will flash a white light every seven seconds. The light will be of 33,000 candle power, and will be visible for twelve miles. The height of the tower will be forty-four feet.

The Alberta, Athabasca and Manitoba, of the C.P.R. lake lines, have been overhauled during the winter and fitted with new boilers and equipment, which will reduce the time of their passage between Port McNicoll and Fort William by three hours, so that they will make the same time on the route as the newer Keewatin and Assiniboia. The whole of the electrical wiring on these vessels has been renewed, and at the same time electric reading lights have been installed in each berth.

Soo Canals Traffic.—With a total of 754,520 tons, the statistical report of traffic through the St. Mary's Canal for the month of April shows a decrease of over one-half of the total for the corresponding month of last year. During April, 1913, 1,905,555 tons was carried. Of the total amount this year the Canadian Canal carried 100,000 tons more than the American Canal; 7,562,526 bushels of wheat in comparison with 584,500 through the American Canal, forming the bulk of the difference.

Sault Ste. Marie, Ont.—Application was made to the city council on May 11 by the Lake Superior Shipbuilding and Drydock Co. for an extension of time in which to commence construction operations, until June 30. According to the original agreement between the company and the city the time limit was May 15. The new drydock which is to be built will cost a million and a half dollars. As the delay in getting plans under way has been mainly caused by legislation routine at Ottawa and Toronto, the time asked for was granted.

A Transformed Tank Ship.—A sailing tank ship, "Jules Henri," of Marseilles, has recently been transformed into a motor tank ship at Wilton's shipyards in Rotterdam. The ship, which originally was 76 meters long, was cut in half after the masts had been removed, and a new section 17 meters long was built at the break. Two Diesel motors, each of 500-horse-power, were then installed. The transformed motor tank ship is now 93 meters long by 12.25 meters wide, and has a capacity of 3,000 tons of oil. After a first voyage to the Black Sea the ship will be employed regularly between Europe and America.

Board of Trade Cruise.—Final plans have been made by the Toronto Board of Trade for their contemplated cruise on the s.s. Rochester of the Canada Steamship Lines. The party, which is expected to number about 200, will join the steamer at Buffalo Wednesday, June 10th, arriving at Detroit the following day, where they will inspect the harbor and park systems, leaving the same evening for Cleveland. They will be the guests of the Cleveland Board of Trade on Friday, embarking the same night for Buffalo, where they are due on Saturday morning. The party will return direct to Toronto from Buffalo.

Oerlikon Steam Turbines.—Two of the most recent types of Oerlikon steam turbines are now running in the central electric station of Stockholm, these being of 10,000-horse-power size. Turbine and dynamo make up a compact group, and the turbines are of a new design, which is claimed to have a number of advantages, one of these being a low steam consumption of 7.9 pounds per horse-power hour. The turbines operate at 3,000 r.p.m. standard speed. Such turbines are made up as usual of blade wheels each in a separate steam chamber, but the combination of speeds and pressures within the turbine is based on a somewhat novel theoretical design.

New C.P.R. Steamers.—Work on the two new Canadian Pacific steamers, Princess Margaret and Princess Melita, now building at Dumbarton, is proceeding rapidly. The former will be launched next month and the Princess Melita in August. The contract calls for delivery at the end of the present year, and they will be placed in the regular service between Victoria, Vancouver, and Seattle early in 1915. The Margaret and Melita will be driven by geared turbines and will, it is said, be the fastest boats on the Pacific coast. A rumor which has been in circulation to the effect that these vessels would be used in the San Francisco trade is denied by the Canadian Pacific Railway Co.

The Cunard Fleet.—The fleet of the Cunard Steamship Co. comprises 27 steamers and tenders, having an aggregate displacement of 284,097 tons, and propelled by engines working up to 309,800 horse-power. The 12 principal steamers are:—The Mauretania (turbine), fitted with engines working up to 67,000 horse-power; the Lusitania (turbine), 67,000 horse-power; the Campania, 30,000 horse-power; the Caronia, 21,000 horse-power; the Carmania (turbine), 21,000 horse-power; the Franconia, 13,500 horse-power; the Saxonia, 10,000 horse-power; the Ivernia, 10,000 horse-power; the Carpathia, 8,000 horse-power; the Andania, 7,500 horse-power; and the Alaunia, 7,500 horse-power. The following three steamers are now building, and will be added in a few months to the fleet:—Aquitania, for the Liverpool and New York mail service; Transylvania, for the New York and Mediterranean service; and Aurania, for Canadian service.

Georgian Bay Canal Commission.—The secretary of the Georgian Bay Canal Commission announces that in addition to the arrangements already reported for the compilation of statistics relating to the movement of traffic on the Great Lakes, the commission has formed its plans for the collection of important facts and statistics concerning freight rates in respect of all classes and routes of traffic entering into the problem, and that, under the direction of an expert, work on this branch of the inquiry will begin at once. On account of the extent of the field to be covered and its complicated nature it will be several weeks before the essential facts and figures are available. It is the intention of the commission to place the result of its inquiry on these points at the disposal of any public bodies or individuals who may wish to make representation before the commission, and ample time will be allowed for the preparation of cases, sufficient notice being given before public hearings are held.

St. Lawrence Coal Trade.—The Dominion Coal Company reports chartering 22 steamers for the 1914 season of St. Lawrence navigation. Mr. A. Dick, of that company, states that the prospects for business are better than ever this year and that it is expected to bring 2,000,000 tons of coal to Montreal. This will be an increase of 300,000 as compared with last year. There has been, says Mr. Dick, no falling off in the quantity of coal brought to Montreal by the company, and this year is expected to mark a new record. Of the 22 steamers now under charter each will probably make an average of four trips a month to Montreal. The vessels with their carrying capacity in tons are:—Alden, 6,200; Batiscan, 7,400; Blackheath, 8,100; Cabot, 500; Cacouna, 1,950; Cape Breton, 2,500; Coban, 1,350; Easington, 2,100; Hochelaga, 7,519; Kamouraska, 7,333; Kronsprins Olav, 6,930; Kendal

Castle, 6,750; Lingan, 7,528; Louisburg, 2,450; Maskinonge, 7,423; Monkshaven, 5,880; Stigstad, 7,100; Stiklestad, 11,-100; Twickenham, 8,100; Wabana, 7,390; Wagama or Wascama, 8,000; Beatrice, 2,000.

St. Catharines, Ont.—The first mishap on the Welland Canal this season occurred at six o'clock in the evening, April 30, when the steamer Compton, of the Hall Forwarding Co., Montreal, carried away three gates of Lock 4, completely tying up traffic. The Compton, which was bound up for Ashtabula, entered the lock at a rather stiff rate of speed and pushed open the headgates some little distance before being completely stopped. The gates, forced back by the pressure of water from the level above, returned unevenly, failed to mitre, were torn from their fastenings and were tossed along with the steamer into the level below, one of the two-foot gates also being wrenched off by the rush of water. A brisk north wind directly abaft, undoubtedly increased the speed of the vessel, which was light. She sustained very little injury, and the damage to the surrounding land will be light, as the level unwatered was small and did not produce a flood of the volume that would have swept over the banks had the accident occurred at Lock 5, the one directly above. The Government repair staff was immediately on the scene, and the gates were replaced by daylight.

Chains for Lock Gate Protection at Panama Canal.—According to a contemporary, great difficulty is being experienced in getting satisfactory strength in the immense chains now under construction at the Boston Navy Yard for the lock-gate protection of the Panama Canal. These chains and their hydraulic operating machinery are an innovtion in canal lock design and operation. They are proposed to be stretched across the locks in front of vessels to arrest the momentum of a ship which, for any reason, gets beyond the control of the electric towing locomotives. The chains are made of 3-in. diameter wrought iron, while the links are 17 in. long by 10¾ in. wide. The twenty-four chains necessary have an average length of 427 ft. each, and weigh 85 lb. per foot. Great variation in the strength of different links have been found, mostly in the welds where the breaks in the chains tested generally occur. All links are tested to about 275,000 lb. The breaking loads have run from 312,000 lb. to 560,000 lb. Open links appear to be stronger than stud links, in general, but they elongate much more. The parts of the chain which will run over the sheaves of the hydraulic operating machines have open links, while the parts which will span the locks have stud links.

Canadian Vessel Captains and Chief Engineers

Through the courtesy of the various Steamship Companies, we are enabled to give a list of 1914 season vessels, together with the names of their above-and-below-ship principal officers.

HUGH CANN & SONS, LTD., YARMOUTH, N.S.

Vessel.	Captain.	Chief Engineer.
Bruce Cann	I. A. Banks	H. Doane
Hugh D.	E. B. Nickerson	R. M. Gammon
John L. Cann	A. L. MacKinnon	John Nixon
LaTour	F. E. Smith	C. Weddleton
Malcolm Cann	J. R. Durkee	D. E. Read
Robert G. Cann	W. E. Morris	J. L. Cann
Wanda	F. L. Nickerson	H. L. Goodwin

CAN. TOWING & WRECKING CO., PORT ARTHUR.

Vessel.	Captain.	Chief Engineer.
Barnes	S. Corson	L. Caley
Home Rule	John Scott	W. Floona
J. T. Horne	G. Scagel	H. Cross
James Whalen	A. Morrison	A. Vigars
Minnie W.	R. Nuttall	John Currie
Orcadian	G. Buell	A. Murray
Roi Tan	W. Garrick	C. Kennedy
Salvor	E. J. Cadott	P. Holland
Sarnia	G. Stitt	L. Williams
Superior	A. Fader	W. Farnell
Viper	A. Trembley	John Farquharson

KEYSTONE TRANSPORTATION CO., MONTREAL.

Vessel.	Captain.	Chief Engineer.
Keybell	J. J. Murray	E. W. Sparling
Keynor	Jas. Martin	John Robertson
Keyport	G. Bunting	R. J. Muchmore
Keyvive	John Mullen	James Boak
Keywest	.....	W. H. Jennison

GREAT LAKES & ST. LAWRENCE TRANSPORTATION CO., CHICAGO.

Vessel.	Captain.	Chief Engineer.
A. D. Davidson	C. Babb	B. Hammond
A. M. Marshall	T. B. Greenway	O. T. Biddle
George C. Howe	F. Hoffman	J. R. Jones
H. G. Dalton	F. C. Hector	C. Crampton
J. S. Keefe	D. Barry	G. Squier
John Crerar	C. Bennett	W. Vollmer
John Lambert	W. Rinn	J. Gallarno
Robert Wallace	J. A. Connelly	Ole Larsen
S. N. Parent	F. H. Johnson	R. S. Mott

ST. LAWRENCE & CHICAGO STEAM NAVIGATION CO., TORONTO.

Vessel.	Captain.	Chief Engineer.
E. B. Osler	P. J. Shaw	W. Robertson
G. R. Crowe	C. E. Robinson	W. Reid
Iroquois	J. H. Hudson	J. E. Readman
W. D. Matthews	S. Hill	W. Harwood

CAN. NORTHWEST STEAMSHIP CO., TORONTO.

Vessel.	Captain.	Chief Engineer.
Atikokan	W. J. Brown	C. Arnberg
George A. Graham	A. A. Hudson	J. H. Louden
Neebing	P. McIntyre	R. R. Foote
Paipoonge	J. N. Foote	H. H. Moore

CAN. PAC. CAR & PASSENGER TRANSFER CO., PRESCOTT.

Vessel.	Captain.	Chief Engineer.
Charles Lyon	W. Henry	L. Black

C.P.R. BAY OF FUNDY SERVICE, YARMOUTH.

Vessel.	Captain.	Chief Engineer.
St. George	M. Cardiff	J. T. Kelly
Yarmouth	A. MacDonald	J. M. Pendrigh

NIAGARA, ST. CATHARINES & TORONTO NAVIGATION CO., ST. CATHARINES.

Vessel.	Captain.	Chief Engineer.
Dalhousie City	J. W. Maddick	J. H. Brown
Garden City	G. Blanchard	H. R. Welch

NORTHERN NAVIGATION CO., SARNIA.

Vessel.	Captain.	Chief Engineer.
City of Midland	J. D. Montgomery	John Osborne
Germanic	F. G. Males	S. Burgen
Hamonic	A. L. Campbell	Jas. Wilson
Huronic	A. M. Wright	John Smith
Ionic	O. Wing	A. E. Crosthwaite
Noronic	R. D. Foote	S. Brisbin

MATTHEWS STEAMSHIP CO., TORONTO.

Vessel.	Captain.	Chief Engineer.
Easton	D. N. Laroche	J. T. Myler
Edmonton	H. Maitland	J. G. Fisher
Masaba	J. A. Smith	W. Whipps
Yorkton	J. Cavannagh	D. McKenzie

UNION STEAMSHIP CO., VANCOUVER.

Vessel.	Captain.	Chief Engineer.
Camosun	A. E. Dickeson	J. Brown
Capilano	S. Nelson	A. Johnstone
Cassiar	G. Gaisford	C. B. Smith
Cheakamus	J. Cockle	R. Wilson
Chelohsin	J. F. Edwards	H. Stacey
Comox	J. Brown	J. McKiernan
Coquitlam	N. Gray	J. D. McPhee
Cowichan	C. Moody	G. Whalen
Venture	J. Park	J. E. Noel

RIDEAU LAKES NAVIGATION CO., KINGSTON.

Vessel.	Captain.	Chief Engineer.
Rideau King	Wm. Scott	D. G. Donovan
Rideau Queen	Ed. Fleming	Thos. Hazlitt

ASSOCIATION AND PERSONAL

A Monthly Record of Current Association News and of Individuals
Who Have Been More or Less Prominent in Marine Circles

J. C. Newman, a director of the Canada Steamship Lines, sailed for the Old Country last Saturday.

Captain James E. Murray, of the "Empress of Ireland," has been appointed harbormaster of Quebec.

Captain R. G. Kendall, commander of the C.P.R. liner Ruthenia, has been appointed captain of the "Empress of Ireland."

Captain Andrew Rattray died at Detroit, Mich., on May 9, aged 72. Captain Rattray was until his retirement two years ago, in the service of the Detroit & Windsor Ferry Co.

Captain Andrew Baird died at his home in Toronto on May 12, aged 80. Captain Baird was at one time one of the best known captains on the Great Lakes, but retired 20 years ago.

B. W. Greer has been appointed agent for British Columbia for the Maple Leaf line of steamers, which ply between New York and Vancouver. His headquarters will be Vancouver.

Frank Waterhouse, head of Frank Waterhouse & Co., North Pacific Coast agents for the Royal Mail Line, left Seattle on April 26, for London, England where an extended conference is to be held dealing with plans for operating the new ships to the North Pacific.

Cecil Doutre, purchasing agent of the Department of Marine and Fisheries, is severing his connection with the service and will go to Montreal as commercial manager of the Canadian Vickers Co., an important post. Mr. Doutre has been in the service for a number of years, and is a valued official.

LICENSED PILOTS.

River St. Lawrence.—Captain Walter Collins, 43 Main Street, Kingston, Ont.; Captain M. McDonald, River Hotel, Kingston, Ont.; Captain Charles J. Martin, 13 Balaclava Street, Kingston, Ont.; Captain T. J. Murphy, 11 William Street, Kingston, Ont.

River St. Lawrence, Bay of Quinte, Murray Canal.—Captain James Murray, 106 Clergy Street, Kingston, Ont.; Capt. James H. Martin, 259 Johnston Street, Kingston, Ont.; John Corkery, 17 Rdieau Street, Kingston, Ont.; Captain Daniel H. Mills, 272 University Avenue, Kingston, Ont.

ASSOCIATIONS

DOMINION MARINE ASSOCIATION.

President—James Playfair, Midland; Counsel—F. King, Kingston, Ont.

GREAT LAKES AND ST. LAWRENCE RIVER RATE COMMITTEE.

Chairman—W. F. Wasley, Gravenhurst, Ont. Secretary—Jas. Morrison, Montreal.

INTERNATIONAL WATER LINES PASSENGER ASSOCIATION.

President—A. A. Heard, Albany, N.Y. Secretary—M. R. Nelson, New York. .. ....

THE SHIPPING FEDERATION OF CANADA

President—A. A. Allan, Montreal; Manager and Secretary—T. Robb, 526 Board of Trade, Montreal.

SHIP MASTERS' ASSOCIATION OF CANADA.

Grand Master—Capt. J. H. McMaugh, Toronto, Ont.; Grand Secretary-Treasurer—Capt. H. O. Jackson, 376 Huron St., Toronto.

GRAND COUNCIL, N.A.M.E. OFFICERS.

L. B. Cronk, Windsor, Ont., Grand President.
A. F. Hamelin, Montreal, Que., Grand Vice-President.
Neil J. Morrison, P. O. Box 238, St. John, N.B., Grand Secretary-Treasurer.
E. Read, Vancouver, B.C., Grand Conductor.
A. J. Ross, Halifax, N.S., Grand Doorkeeper.
James Gillie and A. E. Kennedy, Kingston, Ont., Grand Auditors.

Henry Goldmark, designing engineer, resigned from the service of the Panama Canal on April 15, and sailed for the United States on April 26, to resume, in partnership with his brother, engineering and consulting work in the city of New York. He entered the service of the Isthmian Canal Commission in 1906 and was stationed at its Washington office, in charge of designing, until 1908, when he was transferred to the Isthmus. He has had direct charge, under Colonel Hodges, of the design of the lock gates, floating caissons, chain fender machines, and pontoon bridge, and has supervised the construction of the lock gates.

Presentation.—A pleasing event took place at Montreal recently, when Mr. Joseph F. Dolan, who for the past twenty-two years has been representative of the Richelieu & Ontario Navigation Co., first in Toronto, and for the past thirteen years in Montreal, was presented on behalf of the officials and staff with a handsomely fitted walrus traveling bag and a gold-fitted chatelaine for Mrs. Dolan. The good wishes of the staff were voiced by the traffic manager, Mr. H. Foster Chaffee, and the superintendent, Mr. Thomas Henry. The presentation was the occasion of Mr. Dolan's departure for Boston, where he will be general agent in charge of Eastern Canada and the New England States for the Canada Steamships Lines. In accepting the gift, Mr. Dolan expressed the kindly feeling which marks the relationship of the Canada Steamships Lines, on all parts of the system, and incidentally in his stewardship in Toronto before going to Montreal. Mr. Dolan is one of the best-known steamship officials in Canada.

Directory of Subordinate Councils for 1914.

Name.	No.	President.	Address.	Secretary.	Address.
Toronto,	1	Chas. M. Arnott,	94 Hanley Street,	A. J. Fisher,	641 Bathurst St., Toronto.
St. John,	2	Wilmot Pitt	Indiantown, P. O.,	G. T. G. Blewett,	36 Murray St., St. John, N.B.
Collingwood,	3	W. T. Rennie,	Collingwood,	Robert McQuade,	P. O. Box 97, Collingwood.
Kingston,	4	S. M. Murray,	20 Rideau St.,	James Gillie,	101 Clergy St., Kingston, Ont.
Montreal,	5	A. F. Hamelin,	3210 Le Tang Street,	O. L. Marchand,	2378 Clark St., St. Vincent de Paul, P.Q.
Victoria,	6	John E. Jeffcott,	Esquimault,	Peter Gordon,	808 Blanchard St., Victoria, B.C.
Vancouver,	7	Andrew T. Roy,	3812 18th Ave., W.,	E. Read,	Room 8, Jones Bldg., Vancouver, B.C.
Levis,	8	Michael Latulippe,	Lauzon,	S. G. Guenard,	Bienville, Lervis, P.Q.
Sorel,	9	John Matte,	Sorel,	Al. Charbonneau,	P. O. Box 132, Sorel, P.Qa.
Owen Sound,	10	Wallace Robertson,	1030 4th Ave. West,	James Nicoll,	714 4th Ave., Owen Sound, Ont.
Windsor,	11	Alex. McDonald,	28 Crawford Ave.	Neil Maitland,	221 London St., W., Windsor, Ont.
Midland,	12	Jos. Silverthorne,	Midland,	Jno. A. Murphy,	Midland, Ont.
Halifax,	13	Robt. Blair,	29 Preston Street,	Chas. E. Pearce,	Portland St., Dartmouth, N.S.
Sault Ste. Mari	14	A. E. Lewis.	Box 563, Soo, Ont.,	Geo. S. Biggar,	43 Grosvenor Ave., Sault Ste Marie.
Charlottetown,	15	J. F. McGuigan,	38 Queen Street,	Lem Winchester,	302 Fitzroy St., Charlottetown, P.E.I.
Twin City,	16	Wm. Faloona,	392 Ambrose Street,	Lloyd Williams,	142 Secord St., Fort William, Ont.

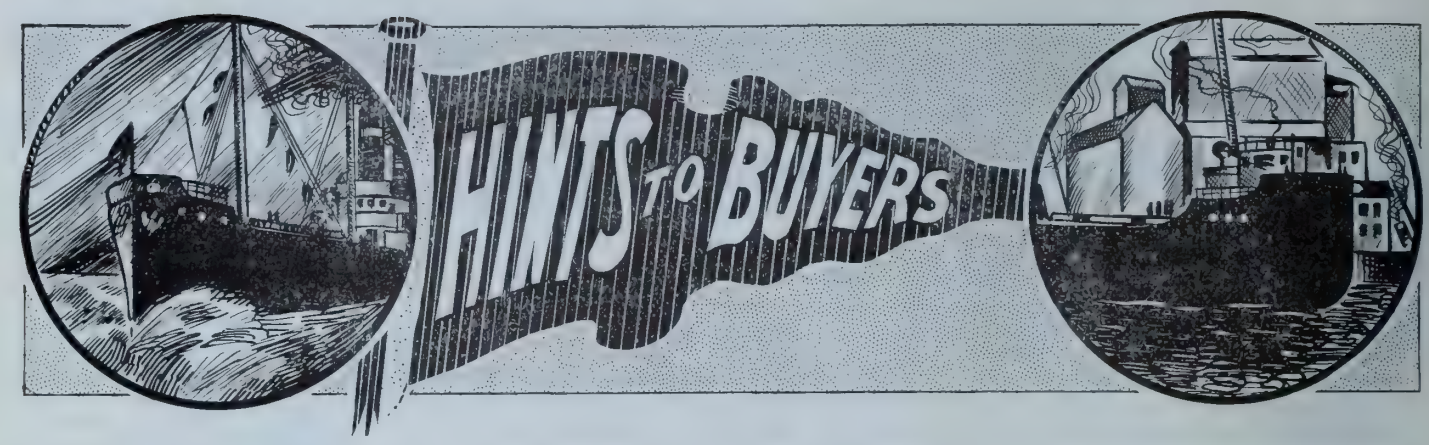
HALIFAX SHIPPING.

DURING the first quarter of the present year up to and including March 31, the shipping entering Halifax reached the million-mark in tonnage. On March 31 the total sail and steam shipping for the first three months of the year amounted to 433 arrivals, of 1,033,509 tons gross. Shipping that entered for the month of March had a total gross tonnage of 395,950 tons, and numbered 170 arrivals, exceeding all months of 1914 so far. There was an increase over January of 17 arrivals and 75,999 tons, and over February of 60 arrivals and 78,342 tons.

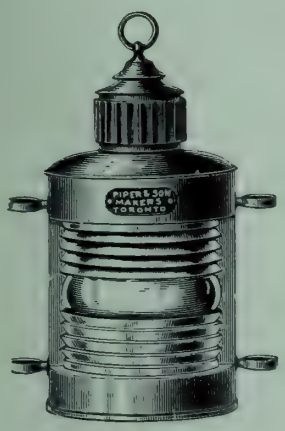
Transatlantic ports led with 85 arrivals of 706,438 tons, and coastwise with 139 arrivals of 138,438 tons came next. In nationalities, British vessels, of course, led with 250 arrivals of 790,768 tons gross, which includes all coastwise tonnage. Norwegian and German ships followed with 51,571 and 47,653 tons respectively.

The total sail tonnage amounted to only 9,658 tons. The number of sail arrivals in March was 68, as against 17 in February, showing to what extent the coastal traffic had opened up during March. There were up to the 31st of March but 11 steamers entered Halifax for coal, which is a much smaller number than for the corresponding time of last year.

Insurance & Professional DIRECTORY

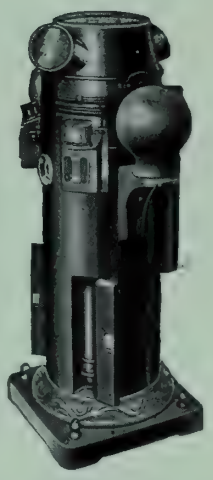


Ship Chandlery



A Complete Line of

Brass or Galvanized Hardware, including Nautical Instruments, Charts, etc. Heavy Deck Hardware "Ship" Brand best Manila Rope, Life Jackets, Ring Buoys, etc.



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For Oil or Electric Light.

Also

Marine Varnishes or Paints, Oiled Clothing, Lamps of all types to meet Inspectors' requirements, for Oil or Electric Light.

Canvas Work

Let us figure on your Hatch or Boat Covers, etc., Bridge Cloths, or Awnings, also a complete line of Flags, Code Signals, etc. House Flags and Burgees to order.

John Leckie Limited

77 Wellington Street W. TORONTO

The advertiser would like to know where you saw his advertisement—tell him

CIRCULATES IN EVERY PROVINCE OF CANADA AND ABROAD

MARINE ENGINEERING of Canada

A monthly journal dealing with the progress and development of Merchant and Naval Marine Engineering, Shipbuilding, the building of Harbors and Docks, and containing a record of the latest and best practice throughout the Sea-going World. Published by The MacLean Publishing Co., Limited

MONTREAL, Eastern Townships Bank Bldg. TORONTO 143-149 University Ave. WINNIPEG, 34 Royal Bank Bldg. LONDON, ENG., 88 Fleet St.

Vol. IV. Publication Office, Toronto—June, 1914 No. 6

Northern Navigation Co. Steamship "Noronic" Commissioned

By C.T.R.

It goes without saying that the addition of this finely appointed vessel to an already highly popular route gives indication that our steamship lines on inland waters are equally progressive with those on the great ocean highways from continent to continent. The supplementary railroad traveling facilities and comforts, it is needless to remark, attain to a like standard of excellence.

THE Great Lakes passenger steamship Noronic, built and engined by the Western Drydock and Shipbuilding Co., Port Arthur, Ont., to the order of the Northern Navigation Co. (now merged in the Canada Steamship Lines, Ltd.), went into commission on Saturday, May 30 last. The occasion was marked by a trip from Sarnia, Ont., to Windsor, Ont., via Detroit, Mich., and Cleveland, Ohio.

A special train consisting of nine Pullman cars carrying the Montreal guests, left the Canadian Metropolis on the evening preceding at 10.30. On arrival at Toronto the number was considerably augmented, a further development in this regard being easily noticeable at various stopping points between the Queen City and Sarnia. On arrival at the latter city, no time was lost getting aboard ship, the train, as per the ordinary schedule arrangement, being run alongside. The Beacon City was dressed for the occasion, a holiday spirit evidently pervading the citizens, complimentary, doubtless, to the pride felt at such a magnificently appointed vessel making her starting point on their waterfront.

With their usual attention to the comfort of those who patronize their services, the Grand Trunk Railway officials had prepared for a distribution of stateroom keys on the train, a practice which will be followed all through the season. This enabled the guests to go straight to their reservations without the tedious wait which usually attends the scanning of tickets and distribution of keys aboard ship.

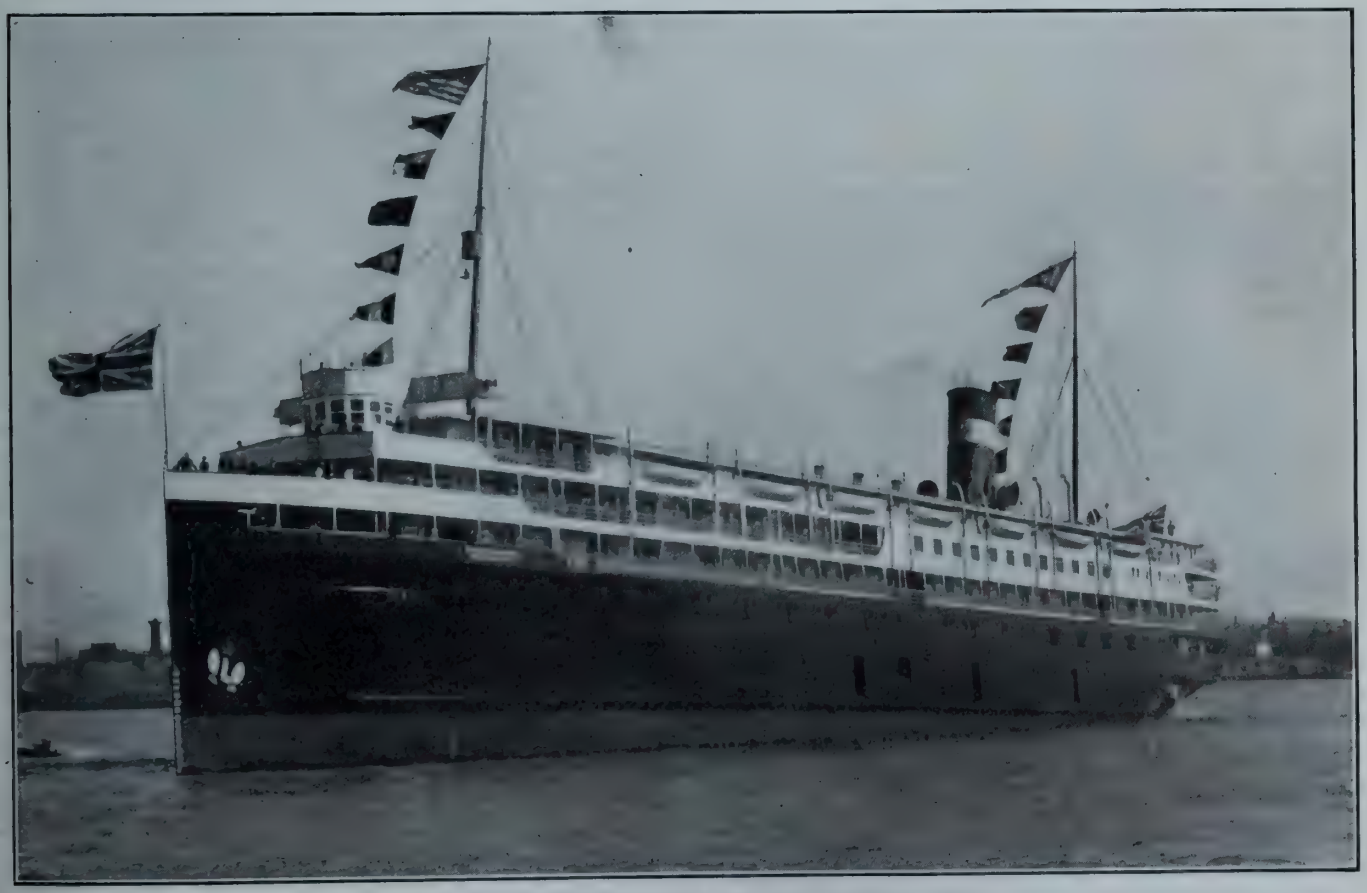
Gala Send-Off.

Punctually at 1.15 a sonorous tooting from the Noronic's syren and a gradual widening of the water between the vessel's side and the dock betokened departure, the band struck up a merry air, the crowd on shore waved handkerchiefs, hats and hands, steamboats shrieked a noisy "good luck," and the Noronic slipped into the center of the stream and was off.

Passing through the beautiful St. Clair river, the St. Clair Flats, with beautifully kept summer hotels and private residences, the smoke of Detroit and its neighboring cities, Walkerville and Windsor across the river, could be discerned down on the horizon. En passant it might be mentioned that the Noronic's bunting was a signal that she was on her maiden trip, and this was duly honored by each and every one of the scores of big colliers, ferry steamers and pleasure yachts in the approved fashion, three long, then two short, welcoming calls. Even diminutive motor boats and launches, which were met with in swarms, particularly in the vicinity of the Flats and Belle Isle Park, Detroit's great river playground, offered honor, and good naturedly, shall we say, Captain Foote had the Noronic's big syren respond to all of them.

Arrival in Detroit.

On arrival in Detroit a dozen big sightseeing automobiles were waiting to take the Noronic's guests around the city. A trip was made to Belle Isle Park, which, on account of the half



S.S. "NORONIC" LEAVING SARNIA ON HER MAIDEN TRIP.

holiday, was thronged with picnickers and amusement seekers. A trip along Jefferson avenue and other thoroughfares led back to the steamer, which during its short stay at the dock was an object of admiring curiosity.

The Noronic's cruise continued down the beautiful Detroit River into Lake Erie, the outer edge of which was reached about ten o'clock Saturday evening. It was a delightful night, not too cold to remain on deck and light enough to afford a charming view of the water. Music and, later on, dancing, in the observation saloon, gave everyone so inclined an opportunity for enjoyment, and there were many who up to Saturday had quite resigned themselves to the fact that their dancing days were done who could not resist the temptation of a first-class orchestra to trip the light fantastic on a polished floor once again.

In the early hours of Sunday morning the Noronic steamed past Cleveland. The ship's log does not say that any of the passengers rose from their comfortable berths to catch a glimpse of the Ohio city. The obliging lookoutman said not, and he ought to know.

Sunday Aboard Ship.

When Sunday morning dawned, and the Noronic's passengers tripped down to breakfast in the grand saloon at 9 o'clock and after, the big vessel was lazily making its way through Lake Erie along the Canadian shore. Many were the fast friendships created while the sun, high in the bluest of heavens, shining on the smoothest of waters gave of its best. It was about three o'clock when the mouth of the Detroit River was entered and the passengers thronged the decks to view the prosperous Canadian and American cities wrapt in their Sunday calm.

Windsor, Ont., the destination of the Noronic, was reached at 3.30 p.m., leaving just half an hour for guests returning to Detroit on the steamer to bid adieu to those who had been their companions of the previous twenty-four hours. The same splendid train was waiting to take the Eastern Ontario and Quebec representatives back to their homes. The Noronic left for Detroit at 4.15 p.m., where an official banquet was held on Sunday evening, the ship being open for public inspection from 5 p.m. until 10 p.m., a boon taken advantage of by hundreds of interested sightseers.

The special train reached Toronto at 10 p.m. Sunday evening and left half an hour later for Montreal, which was reached at 7.20, twenty-five minutes ahead of schedule time, on Monday morning.

Steamship Representatives.

Among the prominent transportation men present on board the Noronic on her initial trip were the following:

Representing Canada Steamship Lines, Ltd.: James Carruthers, president; J. P. Steedman, vice-president; J. W. Norcross, managing director, and wife; F. Percy Smith, secretary, and Master Smith; Hon. J. P. B. Casgrain, director, and Miss Casgrain; W. F. Cloney, general agent passenger department, Buffalo; B. C. Tucker, division freight agent, Cleveland.

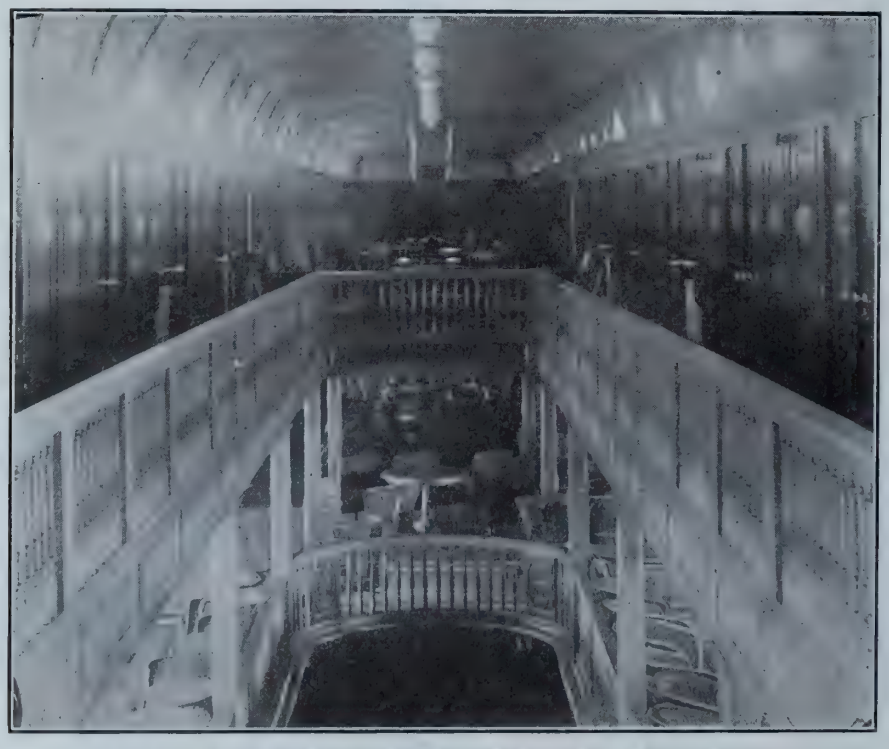
Representing Northern Navigation Co., Ltd.: H. B. Smith, president, and wife, Owen Sound; A. B. Smith, manager of telegraphs, and wife; R. V. Robinson, general freight agent, and Mrs. Robinson; E. W. Holton, general passenger agent; R. I. Towers, attorney, and wife; H. H. Gildersleeve, manager, and wife.

G.T.R. Representatives.

J. E. Dalrymple, vice-president in charge of traffic, and wife; D. E. Galloway, assistant to the president, Montreal, and wife;A. B. Attwater, assistant to the president, Detroit, and wife; H. R. Safford, Chief Engineer, and wife; G. T. Bell, passenger traffic manager; Dr. J. Alex. Hutchison, chief medical officer, and Miss Hutchison; W. C. Chisholm, general solicitor, and wife; L. C. Stanley, attorney, Detroit, and wife; Geo. B. Filgiano, auditor of passenger accounts, and wife; J. E. Duval, general superintendent of car service, and wife; Wm. McNab, principal asst. engineer; U. E. Gillen, general superintendent western lines, and wife; A. F. Read, general foreign freight agent, and wife; F. Price, superintendent of car service, and wife; J. E. Quick, general baggage agent, and wife; W. S. Cookson, asst. general passenger agent, and wife; H. R. Charlton, general advertising agent, and wife; L. L. Grabill, asst. general baggage agent, and wife; J. D. Macdonald, asst. general passenger agent, Chicago, and wife; E. H. Boynton, New England passenger agent, and wife; F. P. Dwyer, general agent, passenger department, New York, and wife; James Edward, division freight agent, Ottawa, and wife; J. Quinlan, district passenger agent, Montreal, and wife; C. E. Horning, district passenger agent, Toronto; W. H. Spicer, division freight agent, Detroit, and wife; R. G. S. Weatherston, division freight agent, Stratford; S. C. Wagstaff, commercial agent, Toledo, and wife.

Others on Trip.

Most of the prominent papers in Canada and the United States sent special representatives on the trip, and among the number of other prominent people present were: Prince Alfred Hohenlohe Schillingsfurst of the Austrian Consulate, Montreal; Hugh Calderwood, naval architect, Barrie, Ont., and wife; J. B. Daagn, Mayor of Sarnia, and wife; J. Milton Dyer, naval architect, Cleveland, and Miss Dyer; J. Dodds, inspector of steamboats, Toronto; J. B. Giles, Montreal, and wife; Mrs. W. J. Hanna and sister, Sarnia; S. E. Kiser, Evanstown, Ill., and wife; Malcolm MacKenzie, board of health, Sarnia, and wife; T. P. Phelan, president Canada Railway News Co., and wife; W. A. Ritchie, district superintendent, Pullman Co., Montreal, and wife; W. H. Smith, manager of Canada Atlantic Transit Co., and wife; C. O. Stillman, Sarnia, and wife; John R. Shaw, Woodstock, Ont., and wife; George W. Parker, D.U.R., Detroit, and wife.



WRITING AND CARD ROOM ON BOAT DECK, S.S. "NORONIC."

The Vessel.

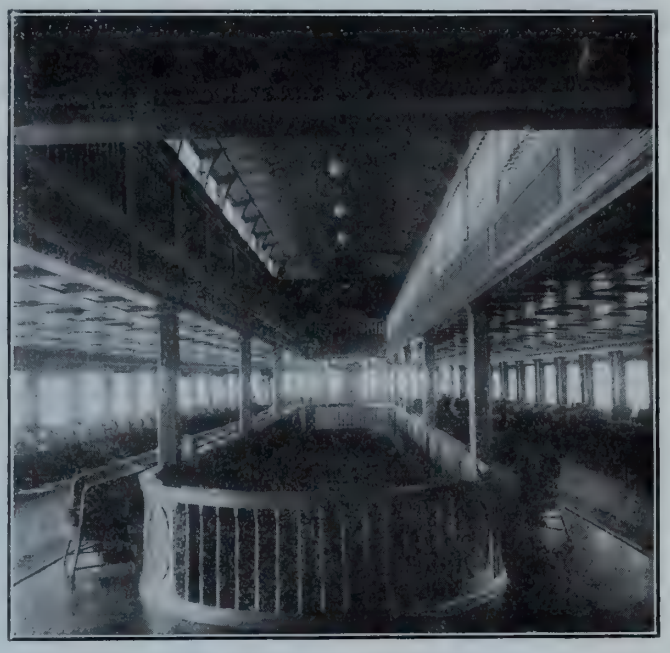
To furnish lake cruising with all the pleasures, comforts and safety of an ocean liner was the purpose behind the creation of the S.S. Noronic, the new flagship of the Northern Navigation Company's great fleet of steamers.

The hull of the vessel has been built of steel to Lloyd's requirements, on the Isherwood construction system, and the leading dimensions of the ship are 385 ft. length over all, 362 ft. between perpendiculars, 52 ft. beam, and 28 ft. 9 in. moulded depth. There are five steel decks—main, spar, promenade, observation and boat. The freight hold is divided into four watertight compartments, and there are eight watertight bulkheads, as well as a double bottom. On the observation deck are the dining and observation rooms, running the whole length of the deck. Two hundred and eighty-six passengers will be able to sit down to meals at one time. On the boat deck are located the officers quarters and pilot-house, suites of private cabins, officers' mess-room, writing-room for crew, firemen's mess, recreation-room for colored help, etc. The woodwork throughout is of mahogany and oak of the best grain and finish, with hand decorated panels. Accommodation is provided for 600 first-class, 240 second-class passengers, and about 200 crew. Fourteen lifeboats are carried.

Machinery Equipment.

The propelling machinery consists of one set of triple expansion vertical engines, having cylinders, 29½, 41½ and 58 inches diameter by 42 inches stroke. Steam is supplied by five Scotch boilers, four of these being 15 ft. 6 in. diameter by 11 ft. long, and one 12 ft. 6 in. diameter by 11 ft. long. The working steam pressure is 200 pounds per square inch, and the furnaces are equipped with forced draft. The engines develop 5,000 i.h.p., and propel the vessel at a speed of 19 miles per hour. Electric light, refrigerating, ship and freight handling machinery of the latest and most approved types have been installed in the vessel. The Noronic, like all the other Northern Navigation Co. steamers, carries an unusually powerful wireless telegraph system, which keeps the boat and passengers in touch with land no matter what the weather conditions are.

DINING ROOM, S.S. "NORONIC."



OBSERVATION ROOM, S.S. "NORONIC."

Accommodation and Decorative Features.

From the moment one enters the steel vestibule which leads to the lobby on the main deck, admiration is compelled by the accommodation, decorative effects and solid comforts to be found aboard the Noronic. The soft English brown finish of the oak paneled walls of the lobby, which form the background for handsomely carved ornamental designs, gives you the idea that you are being shown through a big metropolitan hotel or a new administrative building of some kind. The carved wood ceiling is softly but beautifully gilded, the entire effect being Florentine, which spells delicacy and beauty.

Passing through the entrance, you find the stairway to the spar deck, wherein is placed the office or what might be termed the main lobby. This gives you the first impression of the spaciousness of the ship in general and the care that has been expended for the convenience and pleasure of passengers. This room, located at the centre of the spar deck, is paneled in oak, finished to correspond with the lobby entrance, but enriched and elaborated with reliefs of ornaments, heads and mythological representations of the denizens of the lake, river and ocean. The detail throughout is decidedly of the North, masculine and strong in effect. The floor is finished with a design of green and grey interlocking tile, and at the intersection of the wainscotting and floor is a base of deep toned marble.

On the port side of the lobby is located the purser's office, where will be cared for the necessary business details of the boat. Here clerks will be on duty continuously, and the control of the cabin or bellboys will be from this point. On the starboard side are fitted up elaborate lounge seats, luxuriously upholstered in Spanish leather, and so worked in the general design as to become part of the architecture of the boat. The ceiling is beamed in brown oak with carved design on the edge, dividing the panels throughout; the panels being of painted canvas ornamented with a simple interlacing design in color. The lighting arrangement is by extremely soft shaded ceiling lamps.

Color Effects Harmonize.

Strolling forward, leaving the lobby, we enter what seems a spacious hall with passages at right angles to the different staterooms. This portion of the boat, both fore and aft, is carpeted with a beautiful Wilton carpet in greens, greys and soft-toned browns, the detail being Farragahn. The walls and ceilings of the hall and passageways are enameled in soft, warm greys, it being the object of the architect to do away with the cold white or cold grey prevalent on most lake boats.

On examination of the different staterooms, one is struck with the unusual

features provided by the company for the pleasure and convenience of their guests. Each stateroom has an individual radiator, hot and cold running water and berth reading lights.

Continuing forward, we arrive at an auxiliary staircase to the promenade deck. This, one other, and the grand staircase, provide three approaches from the spar to the promenade deck. At the extreme end of the cabin space are located the maids' quarters, and a sitting-room for their convenience. The furniture used both forward and aft of the lobby is English or Queen Anne style in oak and leather. Passing aft, the arrangement is similar. Here, besides a great number of staterooms, are to be found barber shop, bathrooms, lavatories, etc.

Grand Saloon.

Ascending the grand staircase, we reach the grand saloon, located amidships on the promenade deck. Here the architect has produced effects not only unique and interesting, but has demonstrated the possibilities of doing away with geegaws and questionable ostentation so much in vogue in some of the older lake boats. The carpet here and throughout the deck and adjacent cabins is a beautiful Wilton, extremely thick, blue and soft bronze in color.

To describe all the interesting details of this social hall would require considerable time, but one cannot refrain from mentioning four large carved panels in bold relief. These are designed to tell in a poetical manner the passing of the element from the mountains to the sea.

At the beginning, the water gushes from the mountain; in the heavens floats an eagle, while in the foreground are sporting cherubs. On the right a little boy forces a satyr to take an involuntary bath, and on the left is seen another cherub endeavoring to bathe a leopard. The composition in general gives the effect of little boys at play, and the dignity of the low relief symbolizes the spirit of the mountains.

The second panel shows the water in its next stage, the river. In the distance you see the mountain and the water, or river winding therefrom. Here the designer has shown children somewhat older in years, with river turtles, cranes, etc., in the foreground; while in the left of the picture is seen a figure blowing the pipes of Pan with little cherubs dancing in harmony with same.

The third panel represents water in its third stage, as it enters the lake. In the composition of the work, two principal figures are floating in a swan-drawn shell, surrounded by sporting fish and cherubs. In the distance we see the temple of love and the rays of the noonday sun, and an allegorical figure in extremely low relief, from which the panel derives its name.

The fourth and last picture portrays the ocean, the final resting place of the element. Here we find King Neptune in his chariot drawn by dolphins surrounded by sea maidens, elfins and mermaids. To symbolize the finish of the story is shown the setting sun, also a flight of gulls.

Social Hall.

There are a number of other small but interesting panels shown in the social hall, one being a design of sea elves, another water sprites, dolphins and king fish. This room, like the balance of the deck, is paneled in Cuban mahogany; the ceiling being beamed throughout in the same material. On

R. D. FOOTE, CAPTAIN S.S. "NORONIC."

examination one is struck with the care with which the detail has been studied in order to do away with the slightest clash either in color or design. The ceiling panels are of painted canvas in dark tans, old blues, extremely dull reds and golds. The gold, however, has been deadened or glazed in such manner that there is no effect of glitter or garishness such as one usually expects to see where so much gold has been used in ornamentation.

Both on starboard and port side we find large lounging seats. Here again are noticed the quiet dignity of the mahogany and the rich blues and browns of the tapestry in the finish of the seats. For color effect the windows are draped or hung with straight lines of antique velvet. In addition to the lounging seats there are provided for this deck throughout a number of English fireside chairs in mahogany, upholstered in English blue and brown tapestry. This tapestry appears to have been specially selected or at least it would seem so, when one sees the delicate matching of all the different tones used. The lighting almost everywhere about the ship is concealed or sunken and shaded with heavy translucent glass set in bronze frames. The effect is strong, but restful.

Three stairways are provided to the observation deck, while a railed well pierces both the observation and boat decks. The effect of the color and decoration here attempted is bold, the idea being to produce spaciousness and height, and the architect's efforts have certainly been rewarded with a large measure of success. Continuing forward, we come to the parlor staterooms, paneled in mahogany, with private bath. There are ten in all, (I) and (J) being finished in soft yellowish browns, carpeted with Wilton carpet of special color, and furnished with chairs, table and bed of mahogany with marquetry inlay.

Parlor Staterooms.

The two parlor staterooms (H) and (F) are also paneled in mahogany with clothes closet conveniences, ample mirrors and private bath, all to match the wall design. The walls are hung with damask, the carpet of special green and bronze Wilton, and the ceiling ornamented with design in low relief finished in dull bronze tones.

The two parlor staterooms (E) and (G) are also paneled in mahogany, with clothes closet conveniences, mirrors, private bath, etc. The walls are hung with damask, while the carpet is of special blue and bronze Wilton, and the ceiling ornamented with design in low relief finished in dull bronze tones. The chairs, table and bed are also of mahogany.

Parlor staterooms (C) and (D) are paneled from the ceiling in beautifully toned quarter sawed oak, the ceiling being in English design relief of a dark grey color. The carpets and upholstery fabrics in these rooms are a quite unusual tone of red, and taken in conjunction with the oak paneling and oak furniture, produce a tasteful combination, and at the same time a strong, masculine effect.

The parlor staterooms (A) and (B) are paneled in enameled wood, a dark grey ivory with delicate ornaments in yellow, pink and grey. The furniture is of enameled wood decorated in harmony with the rooms in general. Carpet and upholstered fabrics are of simple tones of grey ivory, to correspond with enamel used. The effect of these two rooms is contradictory to all the other staterooms; in fact, it has been the idea of the architect to so contrast the parlor

staterooms that one at least would not fail to please the many nationalities and peoples whose patronage the Northern Navigation Co. serves.

The Drawing Room.

At the extreme forward end is located the drawing room, being semi-circular in form and a miniature effect of the large observation room on the deck above. About one-half of the beforementioned semi-circle is furnished with upholstered lounges in mahogany, and blue and brown tapestry. In addition to this there are tables and chairs for the convenience of passengers, besides a number of large English fireside chairs. At the right and left of the hall aft are placed two large settees, the idea of the furnishing being to provide ample seating accommodation, no matter how heavy the passenger list may be. Here, as in the social hall, are provided small window hangings of antique velvet.

Luxurious Smoking Room.

One of the noticeable features of the ship is the entrances or exits to the promenade, so necessary when one considers the beauty of the outer deck, which is almost one-eighth of a mile in length. Seated in this drawing-room, one is again struck with the taste that has been displayed by the designer, and the care that has been exercised in all minor details of carving and ornamentation, the beautiful contrasts in color and the general repose of it all.

Aft on this deck is located the smoking-room, ceilinged and walled in grey oak, furnished with large lounging seats, tables and easy chairs, upholstered in a warm, reddish Spanish leather. The windows are provided with hangings of sunproof material of special importation. The floor is a design in interlocking rubber tiling, while the wall paneling and columns are finished with a base of green marble. The lighting arrangements are of bulb design of heavy translucent glass. While the light is ample, the effect is soft. The carving and architectural design of the room is decidedly mannish and extremely comfortable.

Observation Room.

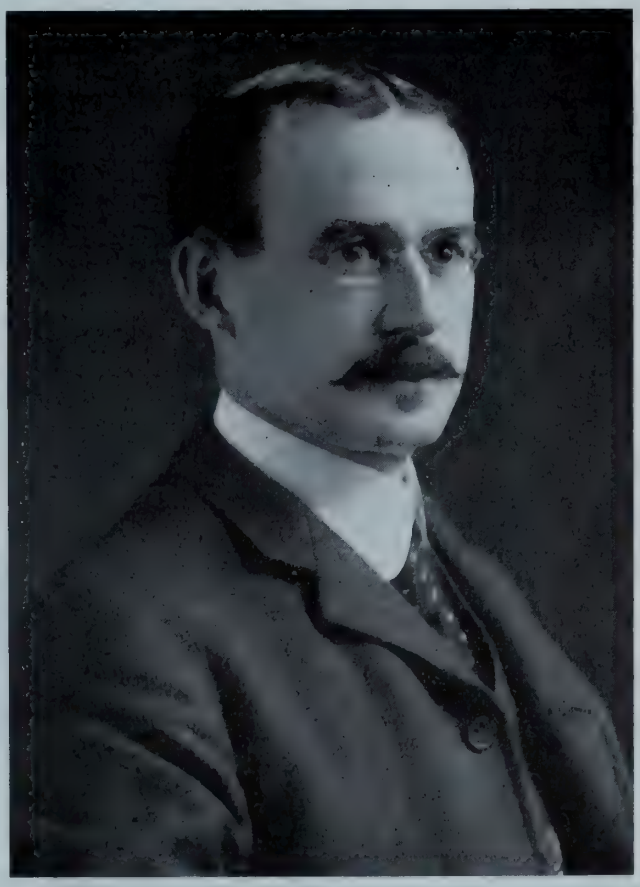
Ascending the stairway to the observation deck we enter at once an extremely large observation room that impresses one as being all glass so far as the walls are concerned. While this is not a fact, it is the impression one gathers. A polished oak floor is here provided for the accommodation of those who desire to dance. The well opening to the promenade deck is protected by a balustrade of oak with carved ornaments at spaces interrupted by panels enriched with base-reliefs illustrating different methods of water travel. First we have a little boy describing the motion of swimming. In the next panel we have another pair showing sculling or rowing, while a third panel illustrates sailing, and the fourth panel, steam navigation.

The columns. supporting the upper deck are enriched with designs from forest and field. In the ceiling which is of paneled oak, are inserted the lighting arrangements, as described for other portions of the boat. The ceiling is also enriched with ornamental panels in low relief, designs of fish, squirrels, frogs and birds. The squareness of the window lights are relieved by very narrow simple hangings. On this deck will be found the news stand and other little whatnots usually to be purchased on a vessel employed in lake travel. The center seventy. feet is carpeted with lighter rugs and furnished with carefully selected reed furniture. The furniture throughout, however, is upholstered with the same material, and all in perfect harmony so far as color and general design are concerned. The general effect of this room is one of quiet dignity and simplicity.

The Dining Saloon.

Aft we pass through the observation room by the well-proportioned orchestra

JAMES WHALEN
President, Western Drydock & Shipbuilding C., Port Arthur, Ont.



HORACE BRUCE SMITH,
President Northern Navigation Co.

stand, where the passengers of the "Noronic" will have all the pleasures of shore ballroom music during the entire tourist season. Through an elaborately carved entrance we reach the dining room. It is in many respects the most delightful of all the pleasing spaces upon the ship. The ceiling is finished in very pale greens and whites, Wedgewood in effect; the low relief being, while flat in effect, beautifully handled. A casual glance impresses one with the amount of stpdy that has been given this very important detail. The walls and columns are of mahogany, rosewood and marquetry inlay.

The room is provided with a sideboard which, while large, is so perfect in scale, so cleverly designed, that one is not conscious of its remarkable size. The windows are tastefully draped with simple hangings of velour with valances narrow in width, and colored in harmony with the general scheme of the room. The dining tables and chairs are of mahogany and bronze, the chairs being upholstered with tapestry of the same soft green used throughout. Attention is called to the unique arrangement in use for the serving table. The plan has been found to work admirably, being a great saver of time, and an immense convenience so far as relieving the kitchen of part of its work during rush times.

The Boat Deck.

On the boat deck are located the writing room, card playing space, etc. The walls are paneled in brown English oak and the ceiling is highly ornamental in color. At forward and aft end above the wainscoting are placed panel decorations not in any way intended to be pictorial or illustrative. Forward it depicts nymphs sporting in the sea, while in the foreground is arranged a flight of gulls. In the center of this panel is placed a clock, and one is reminded that, while there is time for play, time is always in flight. Aft, the panel is decorated by a fanciful design, "Under the Sea." In the forward decoration sporting nymphs are used in conjunction with gulls. In the aft decoration the fanciful figures are mermaids in conjunction with fish. The composition of both decorations is similar, one an effect of "Over the Sea" and the other "Beneath the Sea." The carpets throughout the deck are of black, blue and bronze Wilton. The artificial lighting arrangement is ceiling drop lights. The furniture is a combination of oak and reed upholstered in English tapestry. There are provided two large oblong tables and one small round table for the purpose of correspondence.

At the aft end of the deck are provided ample tables and seats for the accommodation of card players. The staterooms on this deck are similar to those on the promenade deck, being provided with the beforementioned conveniences; carpet in harmony with the balance of the deck and finished in white enamel.

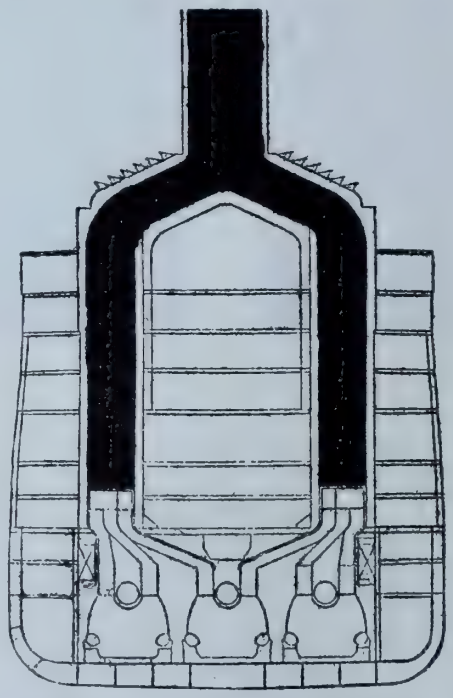
This palatial new steamer of the Northern Navigation Co. will serve the Grand Trunk Railway System between Sarnia, Sault Ste. Marie, Port Arthur, Fort William and Duluth.

AQUITANIA AND MAURETANIA COMPARED.

In view of the fact that the new Cunarder Aquitania is in commission and giving an excellent account of her seagoing qualities, the accompanying comparative data from The Engineer should be of interest:

	Aquitania	Mauretania
Screws	Quadruple	Quadruple
Turbines	Trip. expn.	Compound
Shaft horse-power	56,000	72,500
Sea speed	23 knots	26 knots
Moulded length	865 ft.	760 ft.
Moulded breadth	97 ft.	87½ ft.
Moulded depth	64½ ft.	60½ ft.
Draught	34 ft.	36¼ ft.
Displacement	49,430 tons	41,550 tons
Tonnage, gross	47,000	30,704
Tonnage, net	17,500	12,800
Weight, hull	29,150 tons	19,758 tons
Weight, machinery	9,000 tons	9,402 tons
Total deadweight	11,280 tons	12,390 tons
Coal capacity	6,000 tons	6,354 tons
Passengers carried	3,230	2,150
Crew carried	972	850

It will be seen by the foregoing that the Aquitania is a considerably larger vessel than the Mauretania. She provides accommodation for 1,202 more people, made up of 48 first-class passengers, 154 second-class passengers, 878 third-class passengers, and 122 in the crew. Yet in spite of this very material increase in her accommodation, she may be expected to consume slightly less coal on the voyage across the Atlantic, though the voyage will take about twelve to fourteen hours longer. These considerations show very clearly, we think, the price paid for the last few knots of the Mauretania's speed.



VATERLAND FUNNEL ARRANGEMENT.

SPACE OCCUPIED BY FUNNELS.

One of the novel features of the new ship "Vaterland," which recently made her maiden voyage from Southampton to New York, is the special arrangement of uptakes. The Vaterland is the largest ship in the world, having a gross tonnage of 58,000, while her length is nearly 1,000 ft., with 100 ft. beam, the I.H.P. being about 65,000.

Hitherto it has been almost universal practice to carry the uptakes straight down to the boilers through the intermediate decks. This has the effect of cutting up the passenger accommodation to a certain extent, and in the Vaterland a totally different arrangement has been adopted, the uptakes being arranged in branches passing vertically upwards near the vessel's side, and meeting in a single uptake.

This, no doubt, may be considered an improvement, but it is worth noting here that no funnel arrangements are necessary with motor ships. The advantage of doing away with funnels has not been made a great point of argument in favor of the Diesel ship. Evidently, however, it is a feature which should not be lost sight of.

TO COMPETE WITH CANADA STEAMSHIP LINES.

The first attempt since the organization of the big inland shipping merger last summer to organize a rivalry to its business has been undertaken by the J. & T. Matthews Co., a large firm of Toronto shipowners. The Steelton, an 80,000 bushel grain carrier, has arrived from the Old Country, being the first of four big boats that the company is having constructed there.

When the R. & O. company, backed by British interests, combined the Canadian lake and river shipping in the Canada Steamship Lines last year, there was some talk among shippers of the organization of a mammoth concern which was to build a fleet of lake vessels. The move of the Matthews Company in building four or five new steamers to look after their business is not taken to be the indication of any such larger scheme. It is simply, however, the outcome of the growth of business on the Canadian lakes in the grain trade. The Steelton is equipped to carry bulk cargoes of any nature, and her maiden load was coal for the Dominion Coal Co, which she unloaded at the Bickerdike Pier, Montreal.

Lake Freighter "J.H.G. Hagarty" Launched at Collingwood

By C. W. D.

This vessel is the last word in design and construction of bulk freighters for Great Lakes service, no expense having been spared by the owners and no resources untapped by the builders to make the "J. H. G. HAGARTY" the best of her class in safety, comfort and efficiency.

AS IS usual on such occasions, a large crowd was present when the big freighter, J. H. G. Hagarty, took the water on Thursday, June 18. The vessel has been built by the Collingwood Shipbuilding Co. to the order of the St. Lawrence and Chicago Steam Navigation Co. Mrs. M. M. Jones, niece of John H. G. Hagarty, after whom the vessel is named, performed the christening ceremony. As the vessel began to move, hearty cheers arose from the crowds which thronged the wharves and the shipbuilding company's yard, and when she struck the water, whistles from factories, boats and railway locomotives responded with a perfect Babel of tooting in appreciation of the successful launching. Following the launching, guests of the owners and builders adjourned to the Globe Hotel, where dinner was served.

Guest List.

That Canada should develop more rapidly her marine interests by the construction of vessels was the subject of various after-dinner speeches. Among those present were the following:

Rev. J. G. Broughall, A. E. Hagarty, W. H. Holland, S. Casey Wood, C. T. James, J. W. Aston, G. F. Harmon, H. J. Hagarty, W. S. Hodder, M. G. Hagarty, John B. Coleman, Robert Kerr, D. C. Barr, Capt. Crangle, Capt. McDougall, J. H. G. Hagarty, Thomas Long, A. A. Wright, John Williams, Douglas L. Darroch, Mrs. Mary Morton Jones, Edward W. S. Spragge, Mrs. Anna G. Casey Wood, Col. V. R. Briscoe, Mrs. A. A. Wright, Mrs. Robert McKay, Mrs. Herbert Stephenson, Miss Louise Apers, Mrs. H. D. Calderwood, Mrs. James W. Smith, Miss Jeannette Smith, H. A. Currie, William Fahey, Thomas Britt, John Sheitch, Hugh D. Calderwood, S. H. Lindsay, W. L. Matthews, A. S. G. Boulton, S. T. Mackinard, E. W. McKean, W. G. Bassett, H. Trott, J. B. Foote, R. J. Law, Robt. W. Thom, H. J. Buthy, W. A. Hogg, John Birnie, K.C., James M. Smith, Capt. P. M. Campbell, Thos. P. Long, S. D. Andrews, A. B. Spencer, A. A. Zadder, H. C. Welch, T. C. James, E. J. Appleton, M. B. Byrius, F. W. Bryan, W. A. Clark, J. H. Duncan, S. J. Bailey, J. W. Astin, A. D. Knight, G. F. Harman, George Wolburty, P. S. Lynch and C. G. Marlatt.

Vessel Description.

The J. H. G. Hagarty is among the largest side tank bulk steamers, being of the following dimensions—550 ft. x 58 ft. x 31 ft., and built to the highest class in the Great Lakes Register. As in previous vessels constructed for the St. Lawrence & Chicago Steam Navigation Co., she is greatly in excess of the requirements of the Great Lakes Rules, the top side plating, stringer and gunwale being exceptionally heavy to stand the longitudinal strains. The water bottom is 5 ft. deep, and the side tank, which is 5 ft. wide, extends to the main deck stringer.

The cargo hold is divided into six compartments, being fed by 16 hatches 40 ft. wide x 10 ft. long, at 24 ft. centers. A strongback of plates and angles is fitted in the center of each hatch to give additional support to the 4 in. wooden covers which are secured in place by Mulholland hatch fasteners. To provide additional security, four angle-bar strongbacks are fitted on top of the covers. Every known precaution has been taken to make the hatches and their fastenings thoroughly reliable.

The customary crew, owner's and navigating accommodation is found forward, while the deck houses are of increased strength throughout and fitted with 16-in. circular deadlights. In the after deckhouse are located private and crew's dining rooms, galley, pantry, ice house, firemen's, engineer's and other quarters. The engine room and galley skylights are of substantial design and made entirely of steel instead of pine as has been customary in vessels of this class. Another innovation is the adoption of solid teakwood doors for all deckhouses.

"J H. G. HAGARTY" ON THE WAYS BEFORE LAUNCHING.

Machinery Equipment.

The motive power is supplied by one triple-expansion, jet-condensing engine, having cylinders 24 in.-40 in.-66 in. x 42 in. stoke, supplied with steam by three Scotch marine boilers 13 ft. in diameter by 11 ft. long, working at 185 lbs, pressure under forced draft, the whole being capable of developing about 2400 h.p., and giving a speed of 13 miles per hour loaded. A very complete installation of auxiliary machinery, pumps, etc., has been installed, and the pipes for handling the water ballast are of a large diameter in order to clear the tanks in as short time as possible. Special attention has been given to the steering gear arrangements, which are of very complete nature. A one-ton refrigerating plant has been installed, together with the necessary cold chambers for carrying provisions for the crew.

"J. H. G. HAGARTY" BEING LAUNCHED.

The keel of the Hagarty was laid in the middle of November, 1913, and as the machinery and boilers were installed and practically completed before the launch, it is expected the vessel will be in commission by July 1, a period of 7½ months for building.

A pleasing incident was the presentation of a wrist watch to Mrs. Morton Jones, who christened the boat. It was made by Mr. S. B. Lindsay, on behalf of the Collingwood Shipbuilding Co.

"ISHERWOOD" SYSTEM FOR TWO 11,000 TON COLLIERS.

The following particulars of vessels to be built upon the "Isherwood" system will be read with interest. The largest single-deck steamers flying the British flag are to be built either on the North-East Coast or on the Clyde. What firm will undertake them is at present unknown, but S. C. Chambers & Co., of Liverpool, insist that they shall be constructed on the Isherwood system and have a dead-weight carrying capacity of 11,000 tons. They are to be chartered by the Dominion Coal Co., Sydney, Cape Breton, for ten years. Competition is very keen among shipbuilders for this special order.

An order has been placed with the Maryland Steel Co., Sparrow's Point, Maryland, U.S.A., for two colliers 514 ft. by 65 ft. by 39½ ft. These are for the Isthmian Canal Commission, and are to be built on the Isherwood system of ship construction under United States Government inspection. Two colliers of the same size have already been built by the Maryland Steel Co. for the United States Government. One was the Orion, delivered July, 1912, and the other was the Jason, delivered June, 1913. The Isherwood system seems to have proved by practical experience to be to the Government's satisfaction.

VIRGINIAN UNDER C.P.R. FLAG.

When the Virginian docked at Montreal on her last voyage she flew the Canadian Pacific flag, and instead of going to her usual berth, moored at shed 8, belonging to the C.P.R., the reason for these changes being that she is now under charter to the Canadian Pacific, taking over the lost Empress of Ireland's sailings. She is also carrying the mails. There were a few changes on board, Captain Rennie being absent from the bridge, a C.P.R. commander taking his place, Captain Evans, late of the Lake Manitoba, having been appointed to the Virginian, whilst another C.P.R. official new to the boat was the purser, A. E. Philpots, late of the Montfort.

SHIPPING CASUALTIES AND LOSS OF LIFE.

There was recently issued by the British Government a return of shipping casualties and loss of life for the year ending 30th June, 1913, which deals with Merchant Shipping 1912-13. This return is the annual digest prepared by the Board of Trade of the reports of shipping casualties which are received by the Department, and include every shipping casualty of any importance. The reports are classified and tabulated in various ways according to the nature of the casualty, the class of vessel, the place where the casualty occurred, etc., so as to enable proper comparisons to be made with past years, and so as to group together the information showing the circumstances and conditions under which the casualties occurred. Comparative tables showing in a summary form the principal figures for the last twenty years are prefixed to the return.

It will be seen from the tables that for the year 1912-13 the number of vessels registered in the United Kingdom which were totally lost at sea was 169 (including 10 missing vessels), with a net tonnage of 128,865 tons, and that during the last twenty years the yearly average number has been 235 (including 23 missing vessels), with a net tonnage of 148,834 tons. The figures relating to loss of life include the lives lost not only through the total losses of vessels, but also through sea casualties of all other kinds to merchant trading vessels registered in the United Kingdom. For 1912-13 the numbers of lives lost were 361 crew (including lascars) and 61 passengers. During the last twenty years the yearly average numbers have been 714 crew (lascars included) and 209 passengers.

The average death-rate amongst seamen employed at sea (excluding lascars) from all causes, including disease, for the year 1912-13 was 4.2 per thousand. The numbers of seamen and passengers saved from British vessels and foreign vessels near the coasts of British territory and the United Kingdom are given in the return with the manner in which they were saved. The number of formal inquiries into shipping casualties which were held at home and abroad are also included, with the results of these investigations. Five very comprehensive charts are attached at the end of the return, four of the British Isles and one of the world, showing the position of wrecks and casualties to shipping which took place during 1912-13. The return is to be obtained through any bookseller at the price of one dollar.

The "Empress of Ireland" and "Storstad" Tragedy Inquiry

On no previous occasion has a marine tragedy been brought home to our people like the recent collision with its appalling loss of life between the C.P.R. liner Empress of Ireland and the Norwegian collier Storstad in the lower St. Lawrence. The fullest publicity has already been given the many harrowing scenes, enacted and otherwise, therefore what follows will cover for the most part only the salient points brought out by the evidence before the Court of Inquiry.

THE official inquiry into the cause of the collision between the liner Empress of Ireland and the collier Storstad on the early morning of Friday, May 29, in the lower St. Lawrence, opened in Quebec on Tuesday, June 16; Lord Mersey, who presided at the Titanic inquiry, along with the Hon. Ezekiel McLeod, judge of the Admiralty Court of New Brunswick, and the Hon. Adolphe Placide Routhier, of the Quebec bench, constituting the Commission of Investigation.

There was a strong array of counsel when the case opened, many interests being represented. For the Government appeared E. L. Newcombe, K.C., Deputy Minister of Justice, and Eusebe Belleau, K.C.; for the C.P.R., Butler Aspinall, K.C. (of the English bar), E. W. Beatty, general counsel of the C.P.R., Fred. E. Meredith, K.C., and A. R. Holden, K.C.; for the master, engineers and officers of the Empress of Ireland, Aime Geoffrion, K.C., and Cecil Thompson; for the Storstad, C. A. Duclos, K.C., Charles S. Haight (of the New York bar), John W. Griffin and Norman B. Beecher; for the Dominion Coal Co., charterers of the Storstad, Hector MacInnes, K.C.; for the National Sailors' and Firemen's Union of Great Britain and Ireland, George F. Gibson, K.C.

Blank Contradiction Evident.

Blank contradictions were the outstanding features of the inquiry opening. Complete accounts of the incidents on both vessels from the time the Empress and Storstad sighted each other off Father Point to the conveying of the survivors and bodies to the Storstad after the Empress had foundered were given by Captain Kendall of the Empress of Ireland and First Officer Tuftenes of the Storstad, and two more utterly conflicting stories of the same event could hardly be imagined.

Captain Kendall said that when the fog came up he slowed down the Empress and then brought her to a dead stop. First Officer Tuftenes swore that when the collision occurred, the Empress was going at a fast speed and that the damage she sustained was entirely caused by her own volition.

Captain Kendall swore that after the collision, the Storstad had backed off from the Empress until nearly a mile away and had not tried to stay in the wound so as to help save the passengers. First Officer Tuftenes declared that after the crash came he heard his captain order the engines full speed ahead so as to keep the Storstad in the wound, that the collier had not backed away, and that the subsequent separation of the two vessels was caused by the speed at which the Empress was going, which tore her away and carried her on until she foundered. Captain Kendall swore that the Empress sank practically in the same spot where she was struck.

First Officer Tuftenes swore that he was on the Storstad's bridge and that, after he had sighted the Empress, he ordered his engines slowed down and then stopped after the fog came up, and that subsequently he had ordered his engines started at slow speed, a few moments before the collision, in order to keep the Storstad from drifting helplessly in the current.

Captain Kendall swore that his own

THE SUNKEN C.P.R. LINER EMPRESS OF IRELAND.

ship was lying dead in the river, and that the Storstad, proceeding at about ten knots an hour, her full speed, suddenly appeared in the fog and smashed into his ship's hull. Captain Kendall explicitly declared that he saw the foam curling under the bows of the Storstad as she approached, while the Empress was lying helpless. First Officer Tuftenes equally explicitly swore that he saw "quick" water in the wake of the wounded Empress as she tore past, scraping the wounded bows of the Storstad.

In the same way Captain Kendall was positive that the collision had been caused by the Storstad changing its course to port, while the latter's first officer declared that the Storstad had not changed its course, lying so dead in the river that it would not answer its helm, while he swore he had seen the Empress change its course from starboard to port and that he had watched her green light swing around until he saw the red on the other side.

Conflict Over Signals.

Equally conflicting evidence was given by the two officers regarding the signals. Captain Kendall declared he had given signals which Tuftenes said he had not heard, while the latter said he had heard signals which Captain Kendall said he had not given.

Even as to events after the collision, the accounts of the officers differed. The first officer of the Storstad stated that the ship's boats had at once been launched and also that at least remissness had been shown by the crew of one of the Empress' boats. They had got on the Storstad and had refused to go back on the plea that it was too heavy for them. He further stated that men from the Storstad had then manned it and saved thirty or forty people. He also swore that the Storstad had kept full steam ahead and had cruised around as near as was safe to pick up survivors.

Captain Kendall was equally positive that the Storstad had backed away about a mile and he was not at all enthusiastic about the work of the Storstad's boats.

Second Day's Proceedings.

Though five witnesses were heard not a single apparent ray of light was thrown upon the mystery of how it was the two ships came together in the fog. The evidence was just as contradictory as ever; more so, if that were possible. Out of a mass of testimony, the commission managed to extract a few new points, which, however, only serve to increase the confusion and to indicate that the evidence of the Empress and Storstad officers, conflicting as it does, suggests that a similar state of cross purposes may be found to be the final explanation of the wreck.

At the morning session Butler Aspinall, K.C., acting for the Canadian Pacific Railway, extracted an opinion from Chief Officer Tuftenes of the collier that, according to a diagram he had drawn of the respective positions of the ships when they saw one another just before the collision in the fog, he thought the Empress, which was traveling fast, should have cleared the Storstad. Mr. Aspinall tried to prove the C.P.R. claim that the liner was standing still, otherwise she would have passed across the Storstad's bows, but the witness clung fast to his contention that the Empress was moving. Later Mr. Aspinall sought to show that because the collier rammed herself straight into the liner for twelve feet, the Storstad must have been going at a high rate of speed while the liner was stationary, because if the coal boat was going slow the only other way this could have been accomplished would have been by the Empress approaching her like a crab, something that was, of course, ridiculous.

To substantiate the theory of the Storstad officers that the collier struck the Empress a glancing blow as she rushed across her bows, Mr. Tuftenes contradicted Captain Kendall's claim that the boilers were pierced, as shown by the sheet of flame that poured out at the collision. The witness said he only saw friction sparks, while there was no rebounding of the Storstad, as sworn to by Captain Kendall, only a slight jar being felt.

Captain Andersen of the Storstad was heard. He dealt a severe blow to Mr. Aspinall's theory that the twelve-foot penetration of the collier's nose indicated that her speed supplied the striking power by saying that loaded as his vessel was she would have gone clear through the Empress had she been traveling at ten knots.

The one fact which seemed to be considered of importance was brought out in cross-examination of Alfred Tuftenes, the chief officer of the Storstad. This was that, although he had standing orders to awaken Captain Andersen in case of foggy weather, he had not done so on this occasion until ten minutes after the Storstad had gone into the fog and he had not then told him that another steamer was near. It was shown that he had only awakened Captain Andersen just before the collision.

Captain Andersen stated that, when he had been awakened, he went to the bridge, and almost immediately saw the lights of the Empress, when he ordered his engines hard astern, but too late to prevent the collision. Captain Andersen, however, although he admitted that his chief officer had broken the rules in not calling him, declared that in his opinion this made no difference so far as the collision was concerned, and that he probably would not have reversed his engines earlier even though he had been on the bridge, since he would not have seen the lights of the Empress earlier in the fog. As to the previous signaling he said he knew nothing of it, having been below.

Third Day's Proceedings.

At the morning session C. S. Haight, the New York counsel, who appears for the Storstad, announced that he had a witness, Galway, a quartermaster on the Empress of Ireland, who would testify that the Empress had defects in her steering gear and would not answer her helm properly. This announcement produced a profound impression in court, and Lord Mersey at once practically halted the course of the inquiry until the quartermaster should be produced to give his evidence as to this.

Immediately after the adjournment for lunch, Galway was produced, and told a somewhat confused story that during the past several voyages on the Empress there had been difficulty with the steering gear. He declared that he had, when at the wheel on several occasions, found it to jam, while on one occasion, in the Lower Traverse, the Empress had refused to answer her helm to such an extent that she had almost collided with a vessel called the Alden. According to the original story quoted by Mr. Haight, the Empress had come within ten feet of the Alden, but on examination Galway said that it had only come within about forty feet of the other boat.

Lord Mersey examined the witness, who became very much confused at times and contradicted his story both regarding the jamming of the wheel and the alleged refusal of the Empress to answer her helm. He also told several rather mixed stories regarding his efforts to present his story to the C.P.R. officials and counsel, and intimated that efforts had been made by the Canadian Pacific to get him out of the country in order to prevent him giving evidence.

Under cross-examination Galway had to admit that Captain Walsh, marine superintendent of the C.P.R., and their counsel had told him that he must stay to present his complaint regarding the steering gear, and that he would probably have to stay a week to give his evidence to the inquiry court. This other curious fact was brought out that after seeing the C.P.R. officials, Galway had gone to Mr. Haight, counsel for the Storstad, and volunteered his story. In addition to his statements regarding the bad steering qualities of the Empress, Galway told a story regarding the signals given by her totally at variance with that given by Captain Kendall and the other surviving officers and members of the crew, declaring that he thought he had heard her give a signal of one blast, when all the others swore no such signal had ever been given.

Galway further said he had reported the bad condition of the steering gear to Officer Williams, who was dead, and that when relinquishing the wheel he had told Quartermaster John Murphy that the ship was not steering well, and he should be careful.

Murphy, of the Empress, was called, and at once gave a blank denial to this, declaring that Galway had said no such thing to him, and that on the contrary the Empress of Ireland had steered as well as any ship he had ever known, and that he had never had any trouble with the steering gear.

Pilot Adelard Bernier also gave a straight contradiction to Galway's evidence. He denied that Galway had ever complained to him about the steering qualities of the ship or that her wheel had ever jammed, and stated definitely that on the night in question the wheel had never jammed at all, while Galway had sworn that the wheel had jammed for several minutes. He also point blank denied the statement of Galway that there had been nearly a collision with the Alden while the Empress was on her way down from Quebec.

A good deal of other evidence was taken during the day, which went to show that, after the accident, the crew of the Empress had done everything possible to rescue the passengers. Lord Mersey made a point of this, and during the afternoon instructed Mr. Gibson, who appeared for the Seamen's Union, that it was not necessary to go any further on this point, since there was every evidence that the crew of the Empress had behaved well. Lord Mersey went further, and declared that as far as he could see the crew of the Storstad had also behaved admirably and done all they could to rescue the drowning passengers and crew of the Empress.

Fourth Day's Proceedings.

To-day Mr. Haight and Mr. Griffin for the Storstad called a number of witnesses, including officers and men from the steamer Alden, a coaler chartered by the Dominion Coal Co., and the officers of the Storstad, also chartered by the same company.

While these officers and men had a hard time giving their testimony, due partly to the fact that they spoke all sorts of languages except English, they succeeded in telling the court a sensational story regarding the Empress of Ireland, along similar lines to that of Quartermaster Galway, that the Empress had been steering badly. Odin Sabje and Hans Olveron, two men from the Alden, declared that they had met the Empress the night before and she seemed to behave rather unseemly as regards her steering, so much so as to make them afraid when meeting her, although they said they had passed at a safe distance of three-quarters of a cable length.

This evidence as to the steering qualities of the Empress was directly contradicted by Captain Murray, now harbormaster of Quebec, who formerly commanded the Empress of Ireland, and who swore that to his knowledge she was an unusually easy ship to steer.

Later on, came the evidence of the men from the Storstad, Jacob Saxe, third officer of that boat, giving a story directly in line in most particulars with that told by Captain Andersen and the other officers. He insisted that the Empress of Ireland had sounded single blast signals, that she had been going at considerable speed at the time of the collision, and that the Storstad had been so slowed down that she refused to answer the helm when put hard aport.

THE COLLIER STORSTAD ARRIVING IN MONTREAL HARBOR.

The main result of the day's inquiry from a technical point of view was to emphasize the difference between the stories regarding the catastrophe told by the officers of the two ships.

Fifth Day's Proceedings.

Some new facts were brought out during the examination of the engineers of the Storstad on this day. It was shown that Third Engineer Sindalsen of the Storstad had been on duty at the time the collision occurred. He had kept accurate record of orders in his scrap log until about the time of the collision, but after 3.05 by his ship's time, he had not made any further entries. Then it was shown that later on that evening he had been called by Chief Engineer Syvertsen, and had helped the latter to make up his of-

cial log, to the best of his memory. Syvertsen said he knew from the assistant engineer's log that he had not entered up all the orders received, he therefore told him to make up the rest of his orders to the best of his memory, which he had done and this would account for any discrepancies between the scrap log and the engineer's official log.

This testimony did not satisfy Lord Mersey very well, and he subjected Sindelsen to a searching cross-examination, which was conducted with some difficulty, owing to the apparent lack of understanding of the witness, and difficulties with the interpreter. Finally Lord Mersey rather impatiently asked, "Is there anything in that log you are afraid of? You are giving me the impression that there is something in it which you do not like." To this the witness replied that he had left a number of orders out and had not done all he ought to.

Owing to this discrepancy the Storstad's log lost much of its value as evidence, but it was produced as showing the orders first to go slow and then stop before the collision occurred, with copies of it, translated from the Norwegian.

It was evident from Lord Mersey's examination of the two engineers that he was far from satisfied with the manner in which the log had been made up, and he asked both whether they did not think there was something in the original scrap log which they did not like. The engineers, however, stuck to their explanation, that the log had been simply made up from memory. The chief engineer stated that he had not gone to the engine room for hours after the collision, and had heard none of the orders, thinking the shock was so severe that his life was in danger.

Several Norwegian sailors from the Storstad were also examined, and testified that the Storstad was almost still at the time of the collision, going so slowly that she would not answer her helm. They also agreed that they had seen the Empress going across their bows just before the collision, and that she was going "nearly quick." No cross-examination would shake their statements to this effect.

Sixth Day's Proceedings.

The main features of the sixth day's inquiry was the bringing out of the fact that the log of the Storstad had not been properly made out up to the time of the collision, and that it had been made up afterwards, some time during the evening after the collision. It was shown that this making up of the shop's log had taken place after the matter had been talked over between the officers on the Storstad, and that several entries had been made in the official log which did not appear in the original "scrap" log. This in addition to the fact that the engine room log had been arranged subsequent to the collision led to a good deal of discussion as to the value of such logs, and Chief Officer Tufteness of the Storstad, was sent post haste to Montreal by the afternoon train to see if he could get his original scrap notes from the Storstad, so as to see how they compared with the official log as it was finally arranged. Tufteness was examined as to these post-collision entries in the log, and admitted to Lord Mersey that he had put them in because he thought they would be of importance in view of the collision. He, however, insisted that the entries were correct and that they had ben made to the best of his recollection.

A good deal of other evidences was taken from members of the Storstad's crew, but much of it was repetition of that already given, and all of it was completely at variance with that given by witnesses from the Empresses of Ireland.

Most of the evidence at the afternoon session was of a technical nature, as to the position of the wreck now, and whether it had moved after sinking, or had gone down vertically. It was also shown by Captain Walsh that the Empress before leaving Quebec had been in every way equipped and manned in accordance with the Board of Trade regulations.

Seventh Day's Proceedings.

Continued conflict of evidence was shown in the statements of divers regarding the present position of the Empress of Ireland at the bottom of the St. Lawrence, together with equally conflicting statements regarding the events which sent her to her doom.

Evidence was given by Mr. G. W. Weatherspoon, the expert from New York, who had a crew of divers looking over the wreck, and who lost one of his divers, Edward Cossaboone, whilst looking over the wreckage.

The evidence of Mr. Weatherspoon was to the effect that the Empress was lying with her head to north-east and her stern to the southwest but that the current and the tide is so strong that it was likely that while sinking the Empress would have been very much twisted. He therefore considered that the position of the Empress as she lay could give no idea as to the course she was on when she started to sink. As to the present position of the Empress Mr. Weatherspoon said that she was lying on her starboard side with about seventy-five feet of water above her; she was lying on her wounded side, and it would be a practical impossibility to try to examine her on that side. From his divers' report received it will be impossible to ever raise the Empress.

A good deal of evidence was taken from Captain Walsh and others regarding the equipment of the Empress, all of which went to show that when she sailed from Quebec she was equipped in a manner to meet every demand of the British Board of Trade, with a full supply of boats and life belts and all arrangements regarding boat drill and water-tight compartments fully complied with. Several passengers and officers were also examined, all of whom testified that, after the collision, the discipline ofthe crew on the Empress had been all that could be desired.

Lord Mersey also engaged in a conversation with Mr. Haight over the latter's anxiety to find out if Adelard Bernier, the pilot of the Empresses, was always chosen for this work, arguing, when he found out Bernier was, that he was an interested party and that he always scrutinized the evidence of such witnesses carefully for bias. Lord Mersey ended an exchange of views on the subject by reminding Mr. Haight that if this were true it applies with equal force to every one of the Storstad witnesses. It is expected that the inquiry will probably last until Friday afternoon, June 26.

SAFETY IN SHIPYARDS.

THE British Home Office has issued the following regulations dated April 4, 1914, made by the Secretary of State under Section 79 of the Factory and Workshop Act, 1901 (1 Edw. 7, c. 22), to apply to the construction and repair of ships in shipbuilding yards:—

In pursuance of Section 79 of the Factory and Workshop Act, 1901, I hereby make the following regulations, and direct that they shall apply to the construction and repair of ships in shipbuilding yards. Provided that these regulations shall not apply to the construction or repair of a ship not exceeding 150 feet in length measured from the fore part of the stem to the after part of the stern-post on the range of the upper deck beams, except in awning or shelter deck vessels, in which cases the length is to be measured on the range of the deck beams next below the awning or shelter deck. These regulations shall come into force on the 1st May, 1914.

Duties.

It shall be the duty of the occupier to comply with Part I. of these regulations, and it shall be the duty of all persons employed to comply with Part II. of these regulations.

Duties of Occupiers.

1—A sufficient supply of sound and substantial material shall be availaable

in a convenient place or places for the construction of all stages.

2—All uprights, thwarts and other supports used for the erection of stages, and as far as reasonably practicable the stages themselves, shall be erected by competent persons specially but not necessarily exclusively employed for that purpose by the occupier; provided that this part of the regulation shall not apply to such adjustment or shifting of the staging from time to time by any workman as may be necessary to meet the varying requirements of his work. All stages shall be securely constructed of sound and substantial material, and shall be of sufficient width, as is reasonable in all the circumstances of the case, to secure the safety of the person working thereon.

3—When any plank or planks forming a stage extend less than one foot beyond the inside edge of the support upon which they rest they shall be securely fastened to prevent slipping.

4—The main gangway giving access to the upper parts of the ship shall be securely protected by upper and lower handrails on each side; and there shall be safe means of access to all places in which any person is required to be employed.

5—All ladders used shall be of sound material and of sufficient length to give safe access to the part they are intended to reach. They shall be maintained in good condition and be adequately secured to prevent slipping.

6—All ventilator holes, manholes and dangerous parts of other openings in decks shall be provided with temporary covers in good repair, or other sufficient protection, which shall be maintained in position except when necessarily removed in the course of work.

7—All parts of a ship on which work is being carried on, and the approaches to such parts, shall be efficiently lighted in such manner as is reasonable in all the circumstances of the case to secure the safety of the persons employed. If portable lamps, including hand lamps carried by the workmen, are used for any part of such lighting, they shall be maintained in good condition. Oil lamps shall be provided with properly fitting screw lids or stoppers.

8—When a stage has to be dismantled, and in all cases where materials or articles have to be lowered from a height, adequate precautions shall be taken to secure the safety of persons employed or passing below.

9—Suitable means of removing injured persons from the place of accident shall be provided, and suitable arrangements shall be made for first aid treatment.

10—A competent person or persons shall be appointed to exercise supervision with regard to the requirements of these regulations, and to enforce the observance of them.

Duties of Persons Employed.

11—Every person employed who becomes aware of any defect in the plant or gear which he is using or may be required to use shall forthwith report the same to the occupier or his manager or foreman or any person appointeed in pursuance of Regulation 10.

12—No person employed shall leave any loose articles or materials lying about in any place from which they may fall on persons working or passing.

13—No person employed shall throw down tools, planks, or loose material from the stages, decks or other part of the vessel, without observing the precautions required in pursuance of Regulation 8.

MERCHANT MARINE PROFITS.

Operations of the International Mercantile Marine Co. in 1913 resulted in net profits of $5,716,959. This figure is better by $1,929,048 than the preceding year and quite the best showing made in any year by the company since its organization in 1902.

The substantial increase in net profits enabled the company to make a practically 50 per cent. greater appropriation toward steamship depreciation account than in 1912. Last year there was charged to steamship depreciation $5,401,357, as against $3,655,578 for the preceding year. Averaged over the company's total of gross registered tonnage—that is, its ocean steamships—this appropriation for 1913 was $4.85 per ton, as against $3.42 for 1912.

The business done by the Mercantile Marine during 1913, measured by gross earnings, was $49.041,338, or $5,315,830 more than in the preceding year. Of this, $47,519,404 came under the head of gross voyage earnings, the bulk of which is made up of passenger business on the North Atlantic. Transatlantic passenger business generally showed a big increase, and the International Mercantile Marine Co. shared relatively as largely in this new business as did the other big lines.

The excellent showing of the company, to an appreciable degree, was due to greater operating efficiency. This is indicated, in one respect, by the lower proportion of total expenditure to gross, the ratio for 1913 being 80.5 per cent. as against 82.5 per cent. Total expenditures were $39,474,290, including all charges for repairs, maintenance and overhauling. In 1912, expenses on the same basis amounted to $36,128,183.

TONNAGE CERTIFICATES—THE PANAMA CANAL.

The following is a copy of Circular No. 673 issued by the Governor, Panama Canal, May 26, 1914:—

1—It is important that vessels which expect to use the Panama Canal should provide themselves with the proper tonnage certificate, based upon the rules laid down for Panama Canal measurement. The rules, regulations, and laws which govern this measurement vary from those for similar measurement on the Suez Canal and in the United States and foreign countries, and vessels require a remeasurement in order to conform to the Panama rules.

2—The collector of customs at New York, the collectors in some of the other large cities of the United States, and certain properly designated officials abroad have been authorized to measure vessels under the Panama rules and issue the required certificate, and in order to avoid delay and measurement upon their arrival at the canal, it is strongly recommended that all vessels provide themselves with the proper certificate before their arrival in canal waters.

3—In case a vessel has failed to provide herself with the proper tonnage certificate, it will be of great assistance and save time if she be provided with a full set of blue prints of her plans and a copy of the measurements which were made when she received her tonnage certificate, and also the tonnage certificate itself.

4—Vessels which have the proper certificate will probably suffer no delay in transit, but those which are not so provided will be delayed until the proper measurements can be made.

5—Foreign vessels may be measured not only in their home ports, but also in the port of New York and probably in other large American ports, without any additional charge, but those desiring such measurement should give sufficient notice in advance and appoint a date when they will be empty so as to facilitate the measuring.

6—Under any conditions the canal authorities reserve the right to check and correct any measurement or certificate issued elsewhere.

The Collingwood Shipbuilding Co., has secured a contract from the Dominion Government for the construction of a steam hopper barge to attend the two dredges recently delivered at Sorel. The contract involves an expenditure of $160,000. The boat will be 165 feet long, 35 feet beam, and 14 feet deep, and will be constructed of steel throughout. She will be propelled by powerful engines of 800 h.p.

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Vol. IV JUNE, 1914 No. 6

PRINCIPAL CONTENTS.

COAL FREIGHTING ON THE ST. LAWRENCE.

EDITORIALLY in our May issue reference was made to the epidemic of disasters which had marked the then brief 1914 season of navigation on the St. Lawrence River and Gulf. Within a day or two of our paper coming from the press, the most shocking tragedy that has heretofore marked the development and progress of our marine resources and enterprise was uncovered, and, by the subsequent disclosures, made most painfully evident the fact that in its sacrifice of human life, the Titanic disaster of some two years ago only eclipsed it.

It is not our intention on the present occasion to attempt a diagnosis of the circumstances of the disaster, opportunity for this being available at a later date, besides the work of the Commission of Inquiry is still proceeding. We desire, however, to enlighten our readers on the subject of **Coal Freighting on the St. Lawrence,** particularly on account of its being at the moment somewhat strongly in the limelight, and in doing so we will quote quite largely from our well-informed contemporary, The Canadian Mining Journal:

The recent disaster to the "Empress of Ireland" has brought into prominence a feature of the St. Lawrence shipping route that is very familiar to those who have occasion to sail these waters, but on which the general public is but little informed. Between the beginning of May and the end of October of this year, the Dominion Coal Co. expect to dispatch no less than two million tons of coal from Cape Breton to Quebec and Montreal, while the Nova Scotia Steel Company will ship about 350,000 tons in the same period. In the week ending the 30th May, the Dominion Coal Company sent out from Sydney 99,000 tons of coal destined for the St. Lawrence ports, contained in 14 steamers of between 7,000 and 10,000 tons capacity each. This is the best shipping record the company has yet achieved, but it is only typical, on a slightly larger scale, of what has taken place every week throughout every summer during the past ten years.

It is within the mark to state that 80 per cent. of the shipping tonnage plying the St. Lawrence route is engaged in the transportation of coal. From the time that the drift-ice will permit of navigation until the buoys are taken up in the Autumn, the procession of coal-boats coming and going from Sydney to Montreal is a continuous one, and these boats are loaded, sail, discharge and are returned with a regularity approaching that of a well-ordered railway.

As to the question of blame in the recent appalling event, it would be premature to anticipate the deliberate pronouncement of the investigating authorities, except that from the meagre details which have transpired it appears to be the outcome of an unfortunate combination of circumstances, and there is dreadful irony in the fact that such a catastrophe could occur to a well-found steamer like the Empress of Ireland within sight of land, and that a thousand people should find death in a little over one hundred feet of water.

The small percentage of accidents that have occured in connection with coal-freighting in the St. Lawrence is evidence of the careful and competent navigators that are employed in this trade, a fact that the "Empress" accident but serves to throw into greater prominence, when the circumstances are properly considered.

EMPRESS OF IRELAND—STORSTAD COLLISION INQUIRY.

A CONDENSED report of the inquiry being held in Quebec City relative to the collision between the C.P.R. liner Empress of Ireland and the Norwegian collier, Storstad, which resulted in the foundering of the former, appears in another section of this issue. It will be noted that the inquiry had not been completed at the time of our going to press, although the major portion of the evidence sought had been heard. The proceedings of the concluding sessions will appear in our July issue, and there seems little doubt but the Commission's findings will be known so as to also find a place in the same number.

The whole matter is of the highest degree interest to our large shipping community as well as to all our citizens, although perhaps in lesser degree.

MARINE NEWS FROM EVERY SOURCE

Reuben R. Penney has been appointed harbormaster of the port of Barrington, N.S.

Port Credit, Ont.—The Dominion Government have made a grant of $50,000 for harbor improvements here.

White Rock, B.C. — The Dominion Government has appropriated $5,000 for building a wharf here. Work will begin at once.

The Atlas Shipping Co., Ltd., has been incorporated in Ottawa, Ont., with a capital of $250.000, to carry on business as shipbuilders in Montreal. Incorporators:—Edwin Howard, Jacob De-Wett, Henry C. McNeill, all of Montreal, Que.

Fort William, Ont.—The Great Lakes Dredging Co. have received a contract for dredging out thirty-five acres of land on the south side of the Kaministiquia River, above the G.T.R. bridge, for a turning basin. Work will be started immediately.

Port Colborne, Ont.—The W. Grant Morden discharged a record cargo of 12.470 tons of iron ore at the Canadian Furnace Co. dock here on June 20. The Furnace Company ore unloaders made the fastest time ever known on this cargo.

Maquinna to Lay Up.—After completing her present trip to the west coast of Vancouver Island, the C.P.R. steamer Princess Maquinna will be withdrawn to have minor repairs made to her hull. She touched bottom several weeks ago off Kyuquot.

Owen Sound, Ont.—Amongst the new companies recently incorporated appears the name of the Georgian Bay Navigation Co., of Owen Sound, with a capital of $40,000. This is the company that bought Captain Cleland's boat, the S. S. Soo City.

Ottawa, Ont.—Notice has been given in the Canada Gazette that the Act to amend the Merchant Shipping Act, which was passed last session, will come into force on July 1. It makes some important changes in the existing regulations, particularly in regard to pilotage, to collisions between vessels and the apportionment of damages, etc.

The Georgian Bay Navigation Co., Ltd., has been incorporated at Toronto with a capital of $40,000 to build steam ships at Owen Sound. Incorporators:—M. D. Lemon, H. W. Lemon, and J. K. McLauchlan, of Owen Sound.

Sarnia, Ont.—According to report, the Reid Wrecking Co., will establish a coaling station at Point Aux Barques with the coal they are taking from the steamer Hanna, aground at Point Aux Barques since the big storm of November last year. The Hanna has over 10,000 tons of coal aboard.

St. Catharines, Ont.—On June 10, the steamer "Pueblo," owned by the Canada Cement Co., on entering lock No. 9, of the Welland canal, struck the gates, with the result that six gates were washed away and navigation tied up for four days.

The Great Lakes and Atlantic Canal and Power Co., Ltd., has been incorporated at Ottawa, with a capital of $250,000, to carry on business as marine surveyors at Montreal. Incorporators—E. A. Morgan, G. A. Morrison, and H. Stanislaus, of Montreal.

Shipping Act Amendment.—A proclamation has been issued bringing into effect on July 1 the provisions of the Act to to amend the Merchant Shipping Act as passed at the last session of Parliament. The new legislation affects ocean-going steamships, and gives Canada's adherence to the resolutions passed last year by the International Conference on Safety of Life at Sea.

Sealer Launched.—Bow, McLachlan & Co., Paisley, Scotland, launched last month the sealer Sable 1, which they have built to the order of Captain Farquhar, of Halifax, N.S. The vessel is specially designed for her particular service, being exceptionally strong structurally so as to withstand and break up ice. Electric light and a complete steam heating equipment are other features.

Vancouver, B.C.—At a meeting of the city council of North Vancouver held recently it was announced that Fowler Bros. had taken over the Mainland Iron works, which would be moved across to the North Shore on property controlled by J. P. Fell. The industry will be greatly enlarged, the new development including a graving-dock and a shipbuilding and repairing plant. Work will be commenced at once.

South Vancouver, B.C.—The Dominion Government has appropriated $10,000 for two wharves, one to be built here and the other at Eburne, the grant being provisional upon the donation of sites by the municipalities of Point Grey and Eburne, according to a report made public by Mr. W. J. Prowse at a meeting of the Main Street Improvement Association on May 26.

St. Catharines, Ont.—The big dredge Delver, valued at $100,000, owned by the Dominion Dredging Co., contractors for No. 1 section Welland ship canal, capsized and sank on June 14 in a gale, while the tug Alice, of Port Dalhousie was endeavoring to take it into the harbor from Port Weller, where she had been engaged with other dredges in making a harbor for the new ship canal.

Quebec, Que.—A new dredge just out of the builders' hands arrived here on June 12, having crossed the Atlantic under her own steam. She is of the bucket pattern and capable of removing 1,000 tons of material an hour. The buckets have not yet been fitted, but as soon as this is done she will be able to commence operations and thus push forward the improvements now in progress at this port.

Point Grey, B.C.—Harbor Commissioner Hodgson states that the Dominion Government have made a grant of $10,000 to the North Fraser Harbor Commissioners for the purpose of constructing wharfs at both Eburne and South Vancouver. These wharfs, so Mr. Hodgson intimated, would be constructed by the commissioners just as soon as the municipalities affected would designate and supply the sites.

Montreal, Que.—Justice Dunlop, in Admiralty Court here on June 22, with consent of both parties, ordered the sale by auction of the collier Storstad, which rammed and sank the Empress of Ireland near Father Point on May 29. This

follows the seizure of the vessel on her arrival here on June 1 at the instance of the Canadian Pacific Railway, owners of the Empress of Ireland. The sale will follow due notice of same in newspapers in Montreal, Halifax and New York.

Traffic of Soo Canals.—The statistical report for the month of May issued by United States engineers of traffic through the St. Mary's canals shows a big decrease with the same period last year. The total tonnage during May, 1913, were 11,576,195 tons, while that of 1914 was 7,488,116. Only 2,627 vessels were locked through; of this number the American canal carried 1,684 and the Canadian canal 943, with a total freight tonnage of 3,940,041, as compared with the American canal tonnage of 3,584,075.

Empress of Ireland Salvage.—Underwriters do not regard as hopeful the chances of salving the Empress of Ireland, nor do they think there will be much salvage on account of the depth of water and the position of the vessel. The current is strong and will render the task of divers very difficult. The copper is stowed in one of the lower holds. The vessel may have to be left to break up, as the idea of blowing her up with probably so many dead bodies in her is repugnant.

New Wharf at Windsor.—The Dominion Government has just completed a new 655-foot cement wharf at Windsor at a cost of approximately $60,000, and has begun the erection of a reinforced cement warehouse on it, at a cost of $10,000. The wharf is to be used both as a government pier and a municipal docking point. Windsor up to this time has had virtually no public dock, and the new wharf will be a welcome facility to the city's water transportation.

Underwriters Make Prompt Settlement.—For promptness in the settlement of liabilities, underwriters as a body are justly famed. Although the loss of the Empress of Ireland is so recent, the claims put forward under the various policies have already been presented and passed by underwriters for payment. When it is remembered that it means the disbursement of over $2,000,000, it speaks highly for the readiness of underwriters to "pay up." In connection with this terrible calamity, says Syren and Shipping, the more cautious underwriters hope that it will have a steadying effect on the market. Some of the companies had heavy interests on "disbursements," and at least one of them (usually associated as the "leading" light on many time slips, renewed at more or less ridiculous reductions of rates and values) is said to have been very badly hit. If this be the case, the disaster, from a market and financial point of view, may prove a blessing in disguise.

Victoria, B.C.—With a view to making an immediate start on the construction of the reinforced concrete cribs that will be a feature of the two ocean piers to be erected at Ogden Point, Grant, Smith & McDonnell, the contractors, are now engaged in overhauling and assembling the plant and material alongside the big floating drydock in readiness for the preliminary operations. Two concrete cribs of approximately 3,500 tons each in weight will be built simultaneously on the drydock, and the first of these huge caissons will be put together aboard the craft at the point where she is now moored in the Inner Harbor.

Goderich Breakwater.—The last concrete work on the 1,000-foot extension to the northerly breakwater was completed on June 23 by Contractor Bermingham, whose plant will go into ordinary use unless the Government decides to proceed with the extension of the southerly portion. Great praise is expressed by mariners of the advantage attained by this work, and they are unanimous in their assertions that the speedy completion of the other wall would make this port one of the safest on the lakes. A modern electrically operated foghorn is being installed on the westerly end of the north-west breakwater, which when completed will enable vessels to feel their way into the harbor in any density of fog.

Shipmasters Organize.—At a meeting of about forty shipmasters in the Board of Trade rooms, on May 23, the Fraser River Shipmasters' Association was organized with a full staff of officers for the next year, and with a full complement of committees. Capt. Ford, New Westminster harbor pilot, was elected president; Capt. Boyd, first vice-president; Capt. Robson, second vice-president; Capt. Carter, treasurer; Capt. Coldicutt, secretary. The executive committee is composed of Captains Halcrow, Dauphinee, Minton, Duncan and Peters. Regular monthly meetings will be held and the new organization promises to become one of the most useful bodies in the Fraser Valley.

Canadian Canal Statistics.—Canadian canal statistics just compiled for the period from the opening of navigation until the beginning of the present month show a heavy decrease in tonnage below the statistics for the corresponding period last year. The total traffic for the period amounted to 5,861,728 tons, as against 8,185,850 for the corresponding period last year. This is a decrease of 2,274,122, or nearly 35 per cent. A falling off of 2,855,8897 at the Soo is largely responsible for the decrease in the total traffic. The St. Lawrence canals show an increase of 63,889 tons, and the Welland an increase of 61,822 tons.

Sault Ste. Marie, Ont.—The first important vessel deal of the year was closed on May 26, when E. D. Carter, of Erie, sold the steel steamer E. D. Carter to the Algoma Central Steamship Line, of Sault Ste. Marie, Ont. The price was not given out. The Carter has a capacity of about 9,000 tons, and was built in Wyandotte in 1908. She is of arch construction, with side tanks, and is 524 feet over all, 504 feet keel, 54 ft. beam, and 30 ft. deep, with gross tonnage of 6,359. The Algoma Steamship Co. has been in the market for steel ships of this size for several months, but until recently had been unable to get a price that would meet their views.

Toronto, Ont.—Another lake merger which it is expected will be consummated in a few days, is under way in which the Farrar Transportation Co., Ltd., grain and general forwarders, Collingwood, are involved. The new company, to be known as the Gulf & Lake Navigation Co., is being organized to operate about sixteen steamers. It is understood that Mr. J. W. Norcross, managing director of Canada Steamship Lines, and some American vessel interests are putting through the deal. Mr. Norcross admitted that while such a move was on foot, the new company would not have connection with the Canadian Steamship Lines directly or indirectly.

Two Lighters Launched. — A unique launching was successfully carried out on Saturday, May 30, at the Polson Ironworks, Toronto, when two lighters for the Hudson Bay Terminal slid into the water. Both lighters were built on the same set of ways, and the launching occupied the small space of eight minutes. The christening ceremonies were performed by Miss Meta Gibson, daughter of the Lieutenant-Governor of Ontario. The launching was attended by a distinguished gathering, who after the ceremony were the guests of Col. J. B. Miller, the president and general manager of the company, at a buffet luncheon. Among those present were: The Lieutenant-Governor, Sir J. M. Gibson, Prof. Cohoe, Mr. Sydney Fellows, Captain J. B. Foote of the Toronto Vessel and Insurance Agency; Mr. A. E. Mathews, of the Mathews Steamship Company; Chief Engineer Bowden, of the Dominion Department of Railways and Canals; Mr. J. C. Stewart, etc.

Innovation by Lake Line.—The piles of the Northern Navigation Co.'s docks at all the ports of stoppage of their vessels have been painted in identically the same fashion as the funnels of their steamers, which are easily distinguishable by their stripes of red, white and black. The railroads have found that the traveling public choose to patronize the lines where the depots and the grounds are attractive. Piles dressed in fresh, clean paint give a far better appearance than the dingy ill-kempt docks which characterize many steamboat landing places. The colors add attractiveness to what otherwise would be an uninteresting and uninviting water front, and they furnish an advertising asset which should not be disregarded. All persons who pass have the message borne to them. It is believed that other lake lines will see the possibilities of the idea and adopt it for their properties.

C.P.R. Atlantic Liner Launched.—In the presence of a distinguished gathering, the Messanabi, the new steamer of the Canadian Pacific Atlantic service, was launched at Glasgow on June 20, from the shipyard of Barclay, Curle & Co. Mrs. Geo. McL. Brown, wife of the European manager of the owner company, performed the christening ceremony. The sister ship, Metagama, will probably be launched in about two months' time. Both boats are of the one class type, 13,000 tons gross, twin screw, and have cruiser sterns. Following the launching ceremony the guests were entertained at luncheon, the festivities being presided over by Geo. McL. Brown. Mr. Ferguson, managing director of the Barclay-Curle Co., who followed Mr. Brown, spoke on the subject of oil engines for steamers for the Atlantic, and expressed the hope that the Canadian Pacific would shortly order these for their services.

Scottish Shipbuilding Returns.—The return of vessels launched in Scotland during May are disappointing, especially as regards the Clyde output. In all forty vessels, aggregating 42,846 tons, were launched, and to these figures the Clyde contributed 27 vessels and 40,012 tons, the total being the lowest for the Clyde in any May since 1910, and only five times in the past twenty years have the returns for the month been lower. During the first five months of this year. Scottish shipbuilders launched 193,997 tons of new shipping, or exactly 100,000 tons less than in the corresponding period of 1913, and this notwithstanding that 1914 had an excellent start. There can be little doubt if these figures signify anything, but that they give a tolerably clear indication that the boom in shipbuilding is over.

Canadian Vessel Captains and Chief Engineers

Through the courtesy of the various Steamship Companies, we are enabled to give a list of 1914 season vessels, together with the names of their above-and-below-ship principal officers.

NORTH VANCOUVER FERRY CO., NORTH VANCOUVER.

Vessel.	Captain.	Chief Engineer.
Ferry No. 1	W. Fatke	L. H. Clark
Ferry No. 2	R. Spicer	D. Becker
Ferry No. 3	W. J. Spracklin	J. W. Whitworth

NOVA SCOTIA STEEL & COAL CO., NEW GLASGOW.

Vessel.	Captain.	Chief Engineer.
Wasis	John Ritcey	A. D. Cameron

ONTARIO CAR FERRY CO., LTD., MONTREAL.

Vessel.	Captain.	Chief Engineer.
Ontario No. 1	F. D. Forrest	J. A. Nicoll

OTTAWA RIVER NAVIGATION CO., MONTREAL.

Vessel.	Captain.	Chief Engineer.
Duchess of York	E. P. Shepherd	F. Piche
Empress	A. Blondin	A. L. deMartigny

OTTAWA TRANSPORTATION CO., LTD., OTTAWA.

Vessel.	Captain.	Chief Engineer.
Dolphin	Z. Lavigne	D. Mornaville
Florence	E. Lefebvre	P. Torttier
G. A. Harris	F. Pilon	A. Madore
Glen Allan	A. Clark	G. Beaudet
Hall	J. B. Barclay	W. Drury
Ottawan	A. Malette	H. Lavigne
Sir Hector	W. Mainville	N. Belanger

ALGOMA CENTRAL STEAMSHIP CO., SAULT STE. MARIE.

Vessel.	Captain.	Chief Engineer.
Agawa	J. A. Brown	J. L. Smith
J. A. McKee	R. G. Bassett	A. M. MacInnes
J. Frater Taylor	R. H. Boyle	L. B. Cronk
Paliki	H. C. Wingrove	John Knight
Thomas J. Drummond	A. McIntyre	W. T. Rennie
W. C. Franz	W. C. Jordan	G. Sylvester

CANADA LAKE & OCEAN NAVIGATION CO., TORONTO.

Vessel.	Captain.	Chief Engineer.
Scottish Hero	R. D. Simpson	H. Harrison
Turret Cape	P. D. McCarthy	J. J. Dove
Turret Court	N. Barret	Rathbone

CANADA STEAMSHIP LINES, MONTREAL.

Vessel.	Captain.	Chief Engineer.
A. E. McKinstry	A. E. Stinson	A. C. Leitch
Canadian	R. McIntyre	J. Duguid
Acadian	D. Charland	S. LaRue
Bickerdike	O. Patenaude	F. Hamelin
C. A. Jaques	T. D. Sullivan	A. Hawkins
Cadillac	P. McKay	A. Black
Calgarian	W. Anderson	A. McLaren
City of Hamilton	J. L. Baxter	E. Hamelin
City of Ottawa	W. Cox	S. Murray
D. A. Gordon	R F.. Pyette	G. Adams
Donnacona	R. Alexander	F. Wilson
Doric	H. J. Aitken	Jos. Aston
Dundee	Jas. Woolner	E. Shaw
Dunelm	C. R. Albinson	G. E. Wilson
Emperor	G. W. Pearson	G. Smith
Empress of Fort William	Jas. Wilson	G. Biggar
Empress of Midland	D. Burke	E. House
Fordonian	J. E. Mann	W. Gronning
Glenellah	W. W. Allen	W. A. McWilliams
Haddington	R. J. Wilson	C. Leriche
Hamiltonian	A. B. McIntyre	A. E Kennedy
Kenora	W. Brian	H. McDonald
Martian	J. S. Davis	J. W McLeod
Midland King	W. Cunningham	Jas. McGregor
Midland Prince	Jas. Tindall	J. A. Pickard
Midland Queen	N. McGlennon	J. Boynton
Neepawah	W. Stalker	C. Carr
Renvoyle	H. Redfern	C. Holmes
Rosedale	W. Jewitt	H. McWilliams
Sarnian	G. Mackey	J. D. Andrews
Stadacona	Jas. Connally	W. W. Norcross
Strathcona	C. Dineen	Jas. Fayne
Tagona	J. S. Moore	W. Taylor
W. Grant Morden	N. Campbell	R. Chalmers
Wahcondah	D. F. Cornet	Jos. Kennedy
Winona	B. Garvie	J. Bonner

CANADA ATLANTIC TRANSIT CO., MONTREAL.

Vessel.	Captain.	Chief Engineer.
Arthur Orr	John Simons	D. E. Mance
George N. Orr	H. Jaenke	J. B. Wellman
Kearsarge	W. Baxter	A. P. Williams
Newona	W. J. Moles	W. Paus

MONTREAL TRANSPORTATION CO., MONTREAL.

Vessel.	Captain.	Chief Engineer.
Advance	G. M. Guild	M. J. Shermau
Fairmount	James Reoch	G. Flemming
Glenmount	H. Peters	R. Knight
Kinmount	John Wood	R. Taylor
Prince Rupert	J. W. Sutherland	R. H. Veech
Rosemount	W. Liddell	R. Hepburn
Stormount	P. C. Telfer	F. Moyle
Westmount	F. Howell	W. C. Spencer
Windsor	John Doyle	A. Dunn

ASSOCIATION AND PERSONAL

A Monthly Record of Current Association News and of Individuals Who Have Been More or Less Prominent in Marine Circles

G. M. Bosworth, vice-president of the C.P.R., has returned by the Alsatian from England.

R. G. Reid, president of the Reid Newfoundland Co., has returned from abroad on the Calgarian.

Captain L. A. Demers has resigned his position as harbormaster of the Port of Montreal, and has been appointed wreck commissioner.

Capt. T. Bourassa, deputy harbor master at Montreal, will be promoted to the full position of harbor master of that port in place of Capt. Demers.

T. E. Dalrymple, vice-president of the G. T. R., and George Smithers, of Burnett & Co., brokers, have been appointed directors of the Canada Steamship Lines.

Lieut. James F. Symons, R.N.R., who for the past year and a half has acted as assistant harbor master at Montreal, Que., is promoted to succeed Capt Bourassa, as deputy harbor master of that port.

Captain Carey, of the C.P.R. steamship lines, has retired from the service after 51 years at sea. Captain Carey was the first commander of the Empress of Ireland, but after one season relinquished the command, returning to the Lake Erie, known now as the Tyrolia.

George H. Flood, of St. John, N.B., who has recently been promoted as purchasing agent of the Marine and Fisheries Department, at Ottawa, was the recipient recently of an address, a gold watch and a traveling companion from his friends and colleagues at the customs house. Besides the office staff there were several captains and officers of ships of the service at the presentation, which was presided over by Captain Elkin.

LICENSED PILOTS.

River St. Lawrence.—Captain Walter Collins, 43 Main Street, Kingston, Ont.; Captain M. McDonald, River Hotel, Kingston, Ont.; Captain Charles J. Martin, 13 Balaclava Street, Kingston, Ont.; Captain T. J. Murphy, 11 William Street, Kingston, Ont.

River St. Lawrence, Bay of Quinte, Murray Canal.—Captain James Murray, 106 Clergy Street, Kingston, Ont.; Capt. James H. Martin, 259 Johnston Street, Kingston, Ont.; John Corkery, 17 Rideau Street, Kingston, Ont.; Captain Daniel H. Mills, 272 University Avenue, Kingston, Ont.

ASSOCIATIONS

DOMINION MARINE ASSOCIATION.
President—James Playfair, Midland; Counsel—F. King, Kingston, Ont.

GREAT LAKES AND ST. LAWRENCE RIVER RATE COMMITTEE.
Chairman—W. F. Wasley, Gravenhurst, Ont. Secretary—Jas. Morrison, Montreal.

INTERNATIONAL WATER LINES PASSENGER ASSOCIATION.
President—A. A. Heard, Albany, N.Y. Secretary—M. R. Nelson, New York. .. ....

THE SHIPPING FEDERATION OF CANADA
President—A. A. Allan, Montreal; Manager and Secretary—T. Robb, 526 Board of Trade, Montreal.

SHIP MASTERS' ASSOCIATION OF CANADA.
Grand Master—Capt. J. H. McMaugh, Toronto, Ont.; Grand Secretary-Treasurer—Capt. H. O. Jackson, 376 Huron St., Toronto.

GRAND COUNCIL, N.A.M.E. OFFICERS.

L. B. Cronk, Windsor, Ont., Grand President.
A. F. Hamelin, Montreal, Que., Grand Vice-President.
Neil J. Morrison, P. O. Box 238, St. John, N.B., Grand Secretary-Treasurer.
E. Read, Vancouver, B.C., Grand Conductor.
A. J. Ross, Halifax, N.S., Grand Doorkeeper.
James Gillie and A. E. Kennedy, Kingston, Ont., Grand Auditors.

John Smith, who for the past year was superintendent at the Western Dry Dock & Shipbuilding Co., Ltd., Port Arthur, has been promoted to a higher position at the plant of the American Shipbuilding & Dry Dock Co., at Cleveland, Ohio.

Memorial to Sailors.—A memorial tablet, in memory of the 135 sailors who lost their lives in the storms of last November, was unveiled at the Royal Arthur Sailors' Institute, Port Arthur, on June 25, by Dr. P. T. Copeland, Grand Master of the I. O. O. F. The tablet was presented by the I. O. O. F., and contained a list of the ships lost, with the number of men from each boat.

Frank O. White, a Victorian of many years' experience in the shipping business has just been appointed Lloyd's agent at Victoria, B.C. He succeeds John Waterhouse, who has acted in the capacity for some time past. The agency here comes under control of C. Gardner Johnson, Vancouver, who is the British Columbian representative for the Great Britain concern. Victoria is one of Lloyd's most important stations in Canada.

Princess Margaret Launched—The steamer Princess Margaret, the 6,000-ton steamship of the Canadian Pacific fleet, and the latest addition to the company's Pacific coast service, was successfully launched on June 24 at Dumbarton, Scotland. The christening ceremony was performed by Mrs. Rene Redmond, formerly Miss Marguerite Shaughnessy, daughter of Sir Thomas Shaughnessy, who is visiting the British Isles on her honeymoon. The new boat will be ready to start in about ten weeks' time on her voyage to British Columbia.

Directory of Subordinate Councils for 1914.

Name.	No.	President.	Address.	Secretary.	Address.
Toronto,	1	Chas. M. Arnott,	94 Hanley Street,	A. J. Fisher,	641 Bathurst St., Toronto.
St. John,	2	Wilmot Pitt	Indiantown, P. O.,	G. T. G. Blewett,	36 Murray St., St. John, N.B.
Collingwood,	3	W. T. Rennie,	Collingwood,	Robert McQuade,	P. O. Box 97, Collingwood.
Kingston,	4	S. M. Murray,	20 Rideau St.,	James Gillie,	101 Clergy St., Kingston, Ont.
Montreal,	5	A. F. Hamelin,	3210 Le Tang Street,	O. L. Marchand,	2378 Clark St., St. Vincent de Paul, P.Q.
Victoria,	6	John E. Jeffcott,	Esquimault,	Peter Gordon,	808 Blanchard St., Victoria, B.C.
Vancouver,	7	Andrew T. Roy,	3812 18th Ave., W.,	E. Read,	Room 8, Jones Bldg., Vancouver, B.C.
Levis,	8	Michael Latulippe,	Lauzon,	S. G. Guenard,	Bienville, Levis, P.Q.
Sorel,	9	John Matte,	Sorel,	Al. Charbonneau,	P. O. Box 132, Sorel, P.Qa.
Owen Sound,	10	Wallace Robertson,	1030 4th Ave. West,	James Nicoll,	714 4th Ave., Owen Sound, Ont.
Windsor,	11	Alex. McDonald,	28 Crawford Ave.	Neil Maitland,	221 London St., W., Windsor, Ont.
Midland,	12	Jos. Silverthorne,	Midland,	Jno. A. Murphy,	Midland, Ont.
Halifax,	13	Robt. Blair,	29 Preston Street,	Chas. E. Pearce,	Portland St., Dartmouth, N.S.
Sault Ste. Marl	14	A. E. Lewis,	Box 563, Soo, Ont.,	Geo. S. Biggar,	43 Grosvenor Ave., Sault Ste Marie.
Charlottetown,	15	J. F. McGuigan,	38 Queen Street,	Lem Winchester,	302 Fitzroy St., Charlottetown, P.E.I.
Twin City,	16	Wm. Faloona,	392 Ambrose Street,	Lloyd Williams,	142 Secord St., Fort William, Ont.

TYPES OF CARGO VESSELS AND THEIR CONSTRUCTION.

UNDER the auspices of the Institute of Shipbrokers, Mr. J. W. Isherwood on March 18 delivered a lecture on "Various Types of Cargo Vessels and Their Construction." In the course of his paper, the lecturer introduced many striking illustrations of ship construction, which, he said, should be of considerable advantage to the shipowner intending to acquire new vessels. Mr. Isherwood, in the first place, called attention to the Rules of Lloyd's Register, which, although they have been amended slightly from time to time, are substantially the same as always.

The first example dealt with in the paper was one in which the construction, so far as the arrangement of framing is concerned, is exactly in accordance with Lloyd's published rules, and deals with a single deck cargo vessel of a deadweight of 8,000 tons and about 10 knots speed. The frames in this vessel, known as "deep frames," are bulb angles 12 in. deep and spaced 25½ in. apart. Three side stringers fitted, considered absolutely necessary by Lloyd's Rules, are in vessels being constructed at the present day; only experience can show whether it is structurally safe to entirely dispense with side stringers, this being a matter which cannot be reduced to figures.

It would appear, however, that the plating is more vulnerable between the frames, from various causes, and a stringerless ship must certainly offer less resistance to being breached by collision. Mr. Isherwood considers that this question is worthy of the close attention of shipowners generally, and pointed out that the recent breaking in two in a seaway of the tank steamer Oklahoma, which had side stringers in accordance with the usual practice, should make one hesitate about the wholesale elimination of longitudinal bracing which, as is well known, greatly reinforces the plating to resist bending and tearing.

A comparison was made with a vessel of the same dimensions, draft, and speed as the one already quoted, and one with equal dimensions, etc., but designed on the Isherwood system. With the latter construction it was shown that the deadweight carrying capacity was increased by 200 tons, representing 2½ per cent. of the deadweight capacity of the ordinary vessel. This increased deadweight carrying capacity, it was pointed out by Mr. Isherwood, is brought about by the saving in weight due to the fact that many transverse connections, such as are necessary in ordinary construction, have no function in Isherwood vessels owing to the different distribution of materials, fewer beam knees and bilge brackets being required, and, further, the longitudinal frames are reduced in scantling somewhat in relation to the water pressure.

Thus the lower frames are of 10 in. bulb angle, whilst the uppermost ones are of 7 in. bulb angle, the intermediate frames being graduated between these two sizes. There is also a saving in weight of cement owing to the fact that bilge frame chocks and stringer chocks are obviated. The result of the comparison of the vessels under review shows that the longitudinal strength of the Isherwood ship is 15 per cent. more than the vessel built on the ordinary transverse system.

In his paper Mr. Isherwood also pointed out where the capacity for bale goods in the Isherwood ship is 2.7 per cent. greater; advantages are also claimed for the stowing of long timber. Reference was made to objections made to the longitudinals by some that they form shelves upon which coal and grain may lodge, which would enhance the cost of sweeping down the holds. This objection, it is pointed out, is most trivial, for the whole quantity of coal or grain that could lodge on the longitudinals would not amount to much, and would in themselves be an advantage as forming a staging for men to stand on when doing the sweeping. Better ventilation is another advantage claimed.

A very strong point in favor of the Isherwood system is that the hull is rendered practically, if not altogether, free from vibration. Mr. Isherwood, in dealing with this point in his paper, mentioned that it was a point which he hardly anticipated when formulating his first design, but it has proved to be one of the most prominent features of the system. Special advantages are shown in connection with the construction of oil carriers in bulk, the increase in general structural strength making the system an ideal one for "tanker" construction. The increased carrying capacity is obtained without increased first cost to the owner, and the extra freight-earning power of the ship cannot be neglected. The longitudinal strength is increased 20 per cent.

HANDS OFF MARINE RATES.

REPRESENTATIVES of the manufacturing and shipping interests strongly protested before the special railway committee on May 28 against the proposal of placing shipping rates under the jurisdiction of the Railway Commission.

J. E. Walsh spoke for the Canadian Manufacturers' Association, and emphasized particularly the competition of the United States boats. While conceding that control was desirable, he held that an investigation of conditions should be made.

W. R. Dunn, of the International Harvester Co., Hamilton, said that, if the legislation went through, the company would have to do away with its Hamilton terminals, since it would be driven off the water altogether. It would be cheaper for it to ship from its Chicago factory to the West once water competition was eliminated, as he predicted would result.

Insurance & Professional DIRECTORY

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The "Empress of Ireland" and "Storstad" Tragedy Inquiry--II

On no previous occasion has a marine tragedy been brought home to our people like the recent collision with its appalling loss of life between the C.P.R. liner Empress of Ireland and the Norwegian collier Storstad in the lower St. Lawrence. The fullest publicity has already been given the many harrowing scenes, enacted and otherwise, therefore what follows will cover for the most part only the salient points brought out by the evidence before the Court of Inquiry, and the judgment rendered by the latter.

THE second and concluding portion of the proceedings of the Court of Inquiry appointed to investigate the circumstances of the collision between the Empress of Ireland and the Storstad, together with the finding arrived at, forms the subject matter of the accompanying article.

EIGHTH DAY'S PROCEEDINGS.

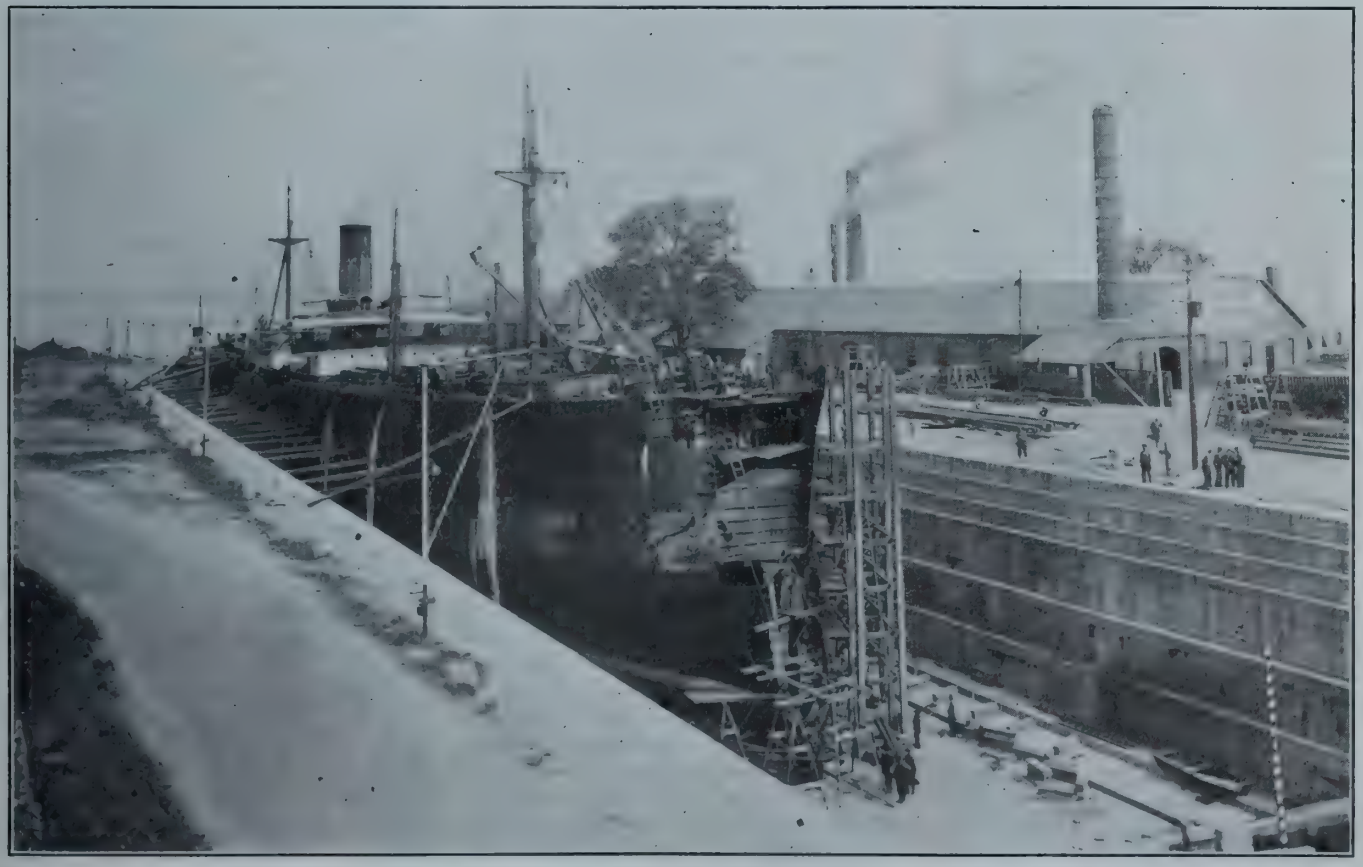
THE eighth day's sitting of the commission indicated that the inquiry would be closed by Friday, June 26, and that thereafter preparation of the report would be begun.

Most of the sessions was taken up with the expert evidence of Mr. Hillhouse, the naval architect from the Fairfield Shipbuilding and Engineering Co., who made the plans for the Empress of Ireland, and who had also examined the Storstad, apparently from a distance. His evidence was frequently decidedly technical, but it was generally to the effect that from what he could discover after looking over the Storstad, the two ships must have come together at an angle of about 80 degrees. This view was combated by Mr. Haight, for the Storstad, who intimated that he would produce an expert on the morrow, in the person of John Reid, naval architect, Montreal, who would show that the two ships were at an angle of about 40 degrees when they collided.

Other evidence was put in by Mr. Hillhouse to the effect that the Empress of Ireland steered well, and had generally been built in a much better manner than the regulations actually demanded, with every possible precaution for the safety of the passengers and crew. It was this which had caused him so much amazement at the rapidity with which the Empress had sunk after the collision. Later he said he had figured out that the Storstad had smashed a hole 350 feet square in the side of the Empress, which had admitted a volume of 250 tons of water a second, while the bows of the Storstad, sticking into the hole they had broken, must have started the list to starboard, which would then go on instantaneously with the terrific inrush of water. It was plain to Mr. Hillhouse that at least two bulkheads had been smashed in, while any portholes left open would, of course, aid the inrush of water and the rapidity of the sinking of the vessel.

Dramatic Evidence of Diver.

Dramatic evidence was given by Mr. Weatherspoon, the New York diving expert, and Wilfrid Whitehead, the diver who had been sent down to rescue Cossaboone, the American diver, who lost his life at the wreck. Whitehead, a typical British marine, gave his evidence in an impressively matter-of-fact manner, and described how he had got down to the hulk of the Empress and clambered over it until he found the place where Cossaboone lay, whence he pulled him out of the mud and carried



COLLIER "STORSTAD" UNDER REPAIR IN DRYDOCK OF THE DAVIE SHIPBUILDING & REPAIRING CO., LTD., LEVIS, P.Q.

him to the surface, where he died. As to the position of the Empress, Whitehead's evidence coincided with that of the other divers, save that he mentioned that she was lying in about 40 feet of mud, and already covered with a thick coating of muddy slime, which made work on her hull exceedingly dangerous.

Several other witnesses were examined during the day, Mr. Weatherspoon in his evidence paying a notable tribute to the courage and skill of Diver Whitehead in going down to the rescue of Diver Cossaboone. The American diver evidently was deeply impressed by the incident, and in a voice of deep emotion said that Whitehead's behavior filled every tradition of the best work of the British navy.

NINTH DAY'S PROCEEDINGS.

THE hearing of exceedingly complicated evidence by experts was the feature of the ninth day's sitting, and the result was that the two experts, Hillhouse and Reid, disagreed as completely as did the other witnesses throughout the hearings.

Stripped of technicalities, Mr. Reid's statement, based upon an examination of the injuries to the Storstad, was to the effect that in his opinion both vessels had headway on when they struck, and that they came together at an angle of about forty degrees. This conflicted with Mr. Hillhouse's evidence, which was to the effect that the vessels came together at an angle of eighty degrees.

Another point upon which the experts differed was as to the rudder and the steering ability of the Empress. Mr. Reid said it was commonly known that the Empress steered badly, and he considered that her rudder was altogether too small for such a vessel.

In rebuttal, Mr. Hillhouse was recalled, when he stated that in his opinion the rudder of the Empress was not only as large as was considered good practice in the merchant marine, but much larger than fitted to many vessels in proportion to their size. Warships, he said, used much larger rudders, because they needed far greater manoeuvring capacity. Most of the other evidence was devoted to clearing up minor points in the case.

Recommendations Regarding Crews.

When the argument opened, Mr. Gibson, for the National Sailors' and Firemen's Union, said that he had been relieved of one duty since it had been shown early in the examination that there had been no remissness, cowardice or misconduct by any members of the Empress crew. He, on instructions from the union, put in the recommendation that on passenger ships there should always be at least two able-bodied seamen for every boat, and that boat drills should be a "working dress" parade, with every boat launched, so that the whole crew should be familiarized with the work. Mr. Gibson's final point was that in the interests of the firemen working far below the surface, there should always be rafts or floats on the top deck, which would float off if the ship sunk. The firemen, he pointed out, had to stay below to the last, and often when they came to the deck the ship would be sinking and the boats gone. In fairness to them some provision of the nature suggested should be provided. Mr. Gibson was thanked by Lord Mersey for his brief and business-like statement of the union's cause.

TENTH DAY'S PROCEEDINGS.

MR. Aspinall, in a speech of three and a half hour's duration, argued the situation regarding the disaster from the C. P. R. standpoint and, as will be noted from a perusal of what follows, he laid the onus on the Storstad. Addressing their Lordships he intimated his desire to discuss the matter under six heads:

1.—To consider whether on leaving Quebec on May 28 the Empress of Ireland was in good seaworthy condition, and properly provided with life-saving appliances.

2.—To consider whether she was sufficiently and efficiently officered and manned.

3.—To consider whether the Empress had taken adequate measures to ensure the proper launching of the boats, whether she had sufficient boat drills and whether proper water-tight compartment drills were held.

4.—To discuss the question as to who was to blame for the collision.

5.—To consider whether, after the collision the master and crew, including the Marconi operators of the Empress took all measures within their power to save life.

6.—To consider and discuss the question as to what was the reason for the Empress' sinking so quickly.

Empress Equipment.

On the question as to whether the Empress was properly equipped with life-saving apparatus and in seaworthy condition when she left Quebec, Mr. Newcombe, for the Canadian Government said there was no complaint to make. He produced evidence to show that the ship had been built according to the highest standard at Lloyd's and under the supervision of its experts, as well as those of the Board of Trade, who were all on the spot watching the ship as she grew. She had a certificate from the Board of Trade showing that she was efficient in equipment and machinery in every way for the service she was intended to carry out, and that all her boats and life-saving appliances, wireless signalling appliances, lights, etc., were in requirements with the Merchants Shipping Act. In addition to this, there was the immigration survey, the immigration officer at Liverpool giving certificate that he was perfectly satisfied with the condition of the vessel, while Captain Staunton's evidence was to the effect that he had thoroughly examined the Empress on May 28, and had found everything in good condition. Mr. Aspinall, therefore, submitted that the evidence showed that the Empress was in an efficient and seaworthy condition at the time the collision occurred.

Manning of Empress.

Proceeding then to the manning and officering of the ship, Mr. Aspinall showed that all the officers were properly certificated; in addition to Captain Kendall, four of the officers held masters' certificates, while two held mates' certificates. As to Mr. Gibson's complaint that there were only 19 able bodied seamen on the Empress, Mr. Aspinall said their count showed there were 24 as well as four quartermasters. In the engineering department there were 15 engineers, two electricians and chief engineer Sampson, making 135 men all told. Eleven of the engineers held first class certificates and the equipment generally was shown to be first class.

Proceeding to head 3, as to whether efficient boat drill and water-tight compartment drill had been held, Mr. Aspinall quoted Captain Staunton to the effect that there had been a watertight compartment drill before the vessel left Quebec, when the closing of the doors took about 3½ minutes. It had also been shown by Captain Kendall that each day an inspection of the watertight doors had to be made with the men at their stations, and that this had been carried out. In this connection, Mr. Aspinall quoted Chief Officer Gaade to the effect that the signal of the long blast of the syren had been calling the men to close the bulkhead doors and run to the boats, and also that all the stewards and other men knew their duties thoroughly in this connection, so that there would be no delay in either proceedings as soon as the syren sounded.

On the morning of the 28th, Mr. Aspinal said it had been shown that an inspection of all the bulkheads and boats had been conducted, while if any door was ever shown to be stiff, it was looked after by the carpenter. It had been further shown by Harrison and other stewards that, as soon as they had heard the syren, they had hastened to their proper doors, but that it was impossible to close them, even then, on account of the terrifie list of the Empress immediately after the collision.

Neither Crew Remiss After Collision.

"I submit," said Mr. Aspinall, "that the evidence shows that the C.P.R. had done everything possible with regard to closing these watertight doors. They had a good system and did everything they could to see that the system was enforced. So far as the public is concerned, I contend that everything possible was done for the saving of lives." After the collision had occurred, Mr. Aspinall said, it was noticeable that no passengers had come forward to suggest that there had been any dereliction of duty on the part of the officers and men. On the contrary, those passengers called had all praised the work of the crew.

"There is no suggestion on either side," said Mr. Aspinall, "that the officers and men of either the Empress or the Storstad were to blame after the accident occurred. Of course there was confusion to some degree on the Empress but there was no panic."

In the same way, said he, all the men in the engine room and stokehole, deep in the lower part of the Empress, have been shown to have remained at their duty, even in face of the inrush of water, and knowing that their lives were in danger, and they worked away doing their duty until they were told to go and save their lives as best they could. As to the boats, Mr. Aspinall said that it had been shown that three had been launched, while unfortunately another had been floated, but just as it was moving away from the Empress, she careened over and sank it, apparently with the loss of every soul on board. "So far as the evidence is concerned, continued Mr. Aspinall, "it is clearly shown that the officers and men of the Empress did everything possible to assist these unfortunate people in saving their lives." We come now to the causes of this collision and who is to blame, continued Mr. Aspinall. It is a remarkable fact that the story we disclosed in our proceedings has been in many ways established by the admissions and evidence of the Storstad crew during the course of this enquiry.

Points To Cause of Wreck.

"We, without knowing what the other side was going to say, were claiming that the collision was caused by an alteration of the course of one or other of these ships. We said that what caused the collision was the putting hard aport of the helm of the other vessel and it is remarkable that, having bound ourselves to that view of the case, it has been proved beyond all doubt that the helm of the Storstad was ported and hard ported, singularly enough, without any orders to that effect having been given by the officer in command. That is a fact which I consider is of immense value to this tribunal in its effort to determine where the truth of this story lies."

Proceeding, Mr. Aspinall said that there was corroboration of the claim of the C.P.R. that, at the time of the collision, the Storstad had steerage way while the Empress was dead on the water, while the Storstad ported her helm, and the Empress never moved to starboard. There was also, he declared, further corroboration that the Empress had sounded the two short blasts indicating she had lost steerage way and was lying dead on the water. It was also shown, he contended, that there was absolute proof that the Empress had twice blown three short blasts.

Analyzing the Conflict of Evidence

"It is most remarkable," said he, "that the Storstad admits that he heard tho series of two short blasts, the first of which must have been several minutes before the collision happened. If these two sets of three signals were given, it can only mean that Captain Kendall was operating with his engines in the way these signals indicated. He was not making these signals for fun, but to tell the other ship that he was reversing his engines, and they admit that they heard these signals. I submit that is a fact of the utmost importance in asking your Lordships to conclude that when the collision occurred we were practically a log on the water without steering way."

Another broad feature in the case was that in order that the Storstad should succeed against the Empress, he would have to ask the court to come to the conclusion that it was not the porting of its helm by the Storstad, but the starboarding of the Empress that brought about the collision. Yet the Storstad admitted that she ported her helm without orders, although she claims that this did not alter her course.

"I think," said Mr. Aspinall, "that I can demonstrate clearly that this is not a fact; also if the Storstad is to succeed Your Lordships must conclude that the testimony of Captain Kendall was a delibtrate perjury. The Storstad admits doing that which would fit with the alteration in the course they claim, but one can understand the frame of mind of the officers of the Storstad when they say that they ported their helm, but that it had not been effected. That is very different from saying (I never starboarded), as Captain Kendall says, shortly after he had been looking death in the face under very distressing circumstances, and having lost not only his ship but a very large number of passengers. I submit your Lordships should be slow to come to the conclusion that the testimony of that man was a deliberate lie in such circumstances."

Rules of the Road.

The two main points, Mr. Aspinall contended, were the alteration of the helm and the speed of the vessel, both of which were closely connected because the speed of a vessel had a direct bearing on the manner in which she would answer her helm, while if she had no way on, her rudder would of course become inoperative. There were two rules which especially applied in this case, 19 and 22.

Rule 22 provided that with two vessels passing on the starboard the starboard side vessel should keep out of the way and avoid crossing the head of the other if there was any risk of collision.

Analysing the evidence Mr. Aspinall said that first officer Tuftenes of the Storstad had agreed with him that when the Empress had changed her course there had been no risk of a collision, since the intervening distance was some miles and there was no danger of collision at that time. If they had passed along they could have passed easily on either side without risk of collision, so he argued this rule did not apply.

Careful Navigation of Empress Claimed.

Further, Mr. Aspinall reminded the court that, after leaving Quebec, the Empress had on three occasions met fog, the last being the fatal one. The evidence showed that on the two previous occasions she had each time slowed down and blown her whistle, which showed that care was being taken in her navigation and that she was proceeding in accordance with the Board of Trade regulations.

Then after leaving the pilot at Father Point, the Empress started down the river. It was shown she had on her bridge the master, the first and third officers, the latter conning the wheel, the quartermaster, operating the wheel, another quartermaster who was standing by and a small boy to run messages. Unfortunately only three of these had been saved.

Then the Storstad had been sighted and Captain Kendall had proceeded through the fog, knowing well that she was in the way and had to be looked out for. If neither ship had altered its course as they stood at that time they would have passed each other starboard to starboard half a mile apart, a perfectly safe distance. To prove this contention Mr. Aspinall quoted the evidence of Captain Kendall and several other officers and men of the Empress.

Then came the fog and Captain Kendall claimed he had sounded his fog blasts in the two series of three short blasts and the Storstad admitted they had heard these signals. In view of this,

Mr. Aspinall argued it had been conclusively proved that the Empress had taken the course indicated by such signals.

The next point taken up was as to whether the ships approached each other port to port, or starboard to starboard; arguing that if the Storstad had kept on the course originally described by her captain, the Empress could only have been hit as she was if she had moved out of her way and thrown herself across the other vessel's bows.

"We say we were red to red," said Mr. Aspinall, "while they say we were green to green, and it is remarkable the number of men who apparently were on the deck of the Storstad at the opportune time to see what the Empress was doing, although it was the middle watch, in the early hours of the morning.

"Captain Kendall has sworn to a thing," proceeded Mr. Aspinall, "which if not correct would be a deliberate lie when he swore he went to the navigation bridge and saw the lights of the Storstad on his starboard bow. It is a matter about which he could not be mistaken, and if we are to put forward a dishonest story it is hardly to be conceived that Jones and Carroll would make such statements as they did, that they had not seen the colored lights of the Storstad, but that her masthead lights seemed to show she was approaching green to green."

Proceeding, Mr. Aspinall said that when asked about the change in course, Mr. Haight had been unable to suggest any reason why the Empress should have starboarded her helm when on the port bow of the other vessel. Now they had evidence that, on the contrary, the Storstad had hard ported her helm and he proposed to show that she had good steerage way at the time.

Proceeding, Mr. Aspinall quoted the evidence of Captain Andersen and other officers of the Storstad, which, if correct, would show that an extraordinary series of blunders had been committed by Captain Kendall and the officers of the Empress in giving signals totally at variance with what Captain Anderson claimed the Empress had been doing.

Empress' Steering Gear.

As to the attacks upon the steering qualities of the Empress, Mr. Aspinall said that these had been engaged in by Mr. Haight because he was afraid he would not be able to make the court believe that Capt. Kendall had lied to them. This led Mr. Aspinall to deal with the testimony of Quartermaster Galway, whose evidence, Mr. Aspinall said, had been to a certain extent supported by witnesses from the Alden.

Galway had made three complaints, that on coming up the river on one occasion the Empress had sheered; that she had sheered on a previous occasion coming up from Liverpool, and that on the night of the calamity while going down the river her helm had jammed. This would mean that the wheel would have been jammed over and could not be got back amidships. Yet the evidence of the men from the Alden was to the effect that the Empress had yawled repeatedly from side to side, while if her wheel had jammed in that narrow channel she would have moved determinedly in one direction. Further, he thought it inconceivable that the witnesses called from the Alden could have any accurate recollection of the meeting with the Empress, the more so as they had passed at a safe distance of about three-quarters of a mile, while they seemed unable to remember details about meeting other boats.

Galway Evidence Unreliable.

It was next pointed out that Galway swore he had complained to Murphy, who had been at the wheel, and to Pilot Bernier, warning them to be careful, because the ship was not steering well, while both declared that this was not true, and in the interview which Galway had given in the Montreal Gazette he had not mentioned a word about this. Further, Pilot Bernier had sworn that Galway had not complained to him that the wheel had jammed, and also swore that if it had jammed for five minutes, as Galway said, he must have certainly noticed it by the "tell tale" on the bridge.

In addition to this, Mr. Aspinall said that previous to the hearing Galway had been examined by A. R. Holden for the C.P.R., and had given his story, but had never mentioned a word about bad steering or jamming of the wheel, thus leaving out what he now claimed was the "principal asset in saving lives." "In view of all this," said Mr. Aspinall, "I submit that this Galway incident should be dismissed by your Lordships."

From this counsel turned to the attacks upon the steering capacities of the Empress and the efforts of Mr. Haight to show that the telemotor system was defective, which he said had obviously been done to pave the way for the evidence of their expert, Mr. Reid. He quoted the evidence of several members of the Empress' crew to show that she had steered well, and that the telemotor had worked properly, and then quoted Mr. Hillhouse, the Fairfield construction expert, to show that same was a standard system.

"It may be that Mr. Hillhouse is so inexperienced as not to know all this," said Mr. Aspinall, "but I submit it is impossible for your Lordships to imagine such a thing."

The vital point, counsel argued, was as to whether the Empress had steered to starboard or not, but when they came to this the Storstad people had instead submitted various theories about the rudder of the Empress. It had been shown in evidence that in 1908 improvements had been made to her rudder, and that since that time no complaints had ever been made. "On this phase of the case," said Mr. Aspinall, "I submit that I have established that our helm was never starboarded, and that the steering-gear never failed on this occasion. This carries me the whole way in the case for the Empress."

Storstad's Course and Steering Way.

Mr. Aspinall next proceeded to discuss the course taken by the Storstad. The vital point in her evidence was the admission that her helm had been hard aport under very odd circumstances, and that the second officer had taken it upon himself to put her helm hard aport.

"What actually happened on the bridge of that ship we shall probably never know, but we do know that the captain was not called to the bridge until the last moment, and that immediately after a good steering ship was taken out of the hands of the man at the wheel under the circumstances I have already described. It is at least odd that such things should have happened on the bridge of this vessel."

Mr. Aspinall proceeded to argue that it had been conclusively proved that there was steering way on the Storstad when the order had been given to port her helm, and quoted Johanssen, the man at the wheel, as declaring that while he did not know just how fast she had been going, the Storstad at the time had steerage, and also that she was a good steering vessel. The Storstad's expert, Mr. Reid, had shown that she had way upon her at the time of the collision, since he had said "she drove herself into the side of the Empress." This was a remarkable admission, but Mr. Reid had been compelled to make it because there was that terrible wound in the Empress' side, and there had to be some explanation as to how that blunt instrument, the bow of the Storstad, could make such a blow.

Chief Justice McLeod—"My impression is that the Storstad signaled that she was dead in the water and then signaled the engines slow ahead, so she had way on."

Mr. Aspinall—"That is further evidence that she had way on, and so altered her course when the order was given to port her helm, and Mr. Haight and myself both agree that it is the vessel which altered her course which caused the trouble. I was careful to warn Mr. Reid when he said that the

Storstad had way on, but he was positive to that effect."

That the Storstad had steerage way Mr. Aspinall argued, was also shown by the engine-room log. It was shown that she was going full speed, 10 knots, at three o'clock, with a full load, which in such circumstances would carry her ahead for a considerable time. Although her engines were put at slow speed until 3.02, she would not slow down for some minutes, and then at 3.02 came the order to stop. Then at 3.05 the order came full speed astern, and thirty seconds later the collision occurred.

"I maintain that this log conclusively shows that all we claim actually occurred," said Mr. Aspinall.

"They admit putting her helm hard aport, and this engine log shows that she must have had headway at the time. The men on the Storstad all say they were most careful to look at the compass, and that she was making her course, but I submit that this is not correct. Why should they all have been so careful to look to the compass? According to their evidence the master is summoned. He is not informed that there is any vessel near in the fog, but the first thing he does is to look over to see if she is on her proper course. It seems odd that he should do such a series of things when, so far as he knew, everything was safe. I invite your Lordships to say that such did not take place, and is not right. I also suggest that the evidence of Tuftenes that he also looked at the compass is not right. Then there is the claim of Saxe, who put the helm hard aport, and always kept his eye on the compass. I submit that was not correct. My suggestion is that there was the whistle of the Empress ringing out closer and closer, and that the people on the Storstad, instead of so busily watching their compass, were keeping their eyes skinned to pick up the Empress as soon as she came into sight."

Excuse for Porting Storstad's Helm.

Considerable discussion followed as to the effect of the current on the Storstad. Mr. Aspinall taking the ground that this was a lame excuse for porting the helm of the Storstad and declaring that the evidence was overwhelming to establish that she had way on, when the order to port her helm was given. He suggested that the Storstad had been misled by the signals in the fog and had ported helm in the hope of giving the Empress more room.

"All the evidence from my ship is that her helm was never starboarded, and the evidence from the Storstad is that her helm was ported under what I might call suspicious circumstances."

Lord Mersey—"Well, in the circumstances there was the risk of a risk, if you understand what that means."

Mr. Aspinall—"I don't think that expression has been altogether approved of."

Lord Mersey—"No, if you were to do that you might have to get the risk of a risk of a risk."

Proceeding, Mr. Aspinall elaborated his argument that the Storstad must have had way on when Captain Andersen was called up, and that his explanation of what went on subsequently was not altogether probable. Further, the position of the wreck in the water, as shown by the divers, could give no indication whether the Empress was in motion when the collision occurred, since none did say what would happen after such an event; but it has been shown by passengers that the proper signals were given by the Empress, and that she was stopped at the time.

Expert Testimony Analyzed.

In conclusion, Mr. Aspinall dealt with the evidence of the experts, Hillhouse and Reid, pointing out that their evidence was absolutely contradictory, even differing 100 per cent. in their estimate of the angle at which vessels had met. There was, however, no doubt that the sudden sinking of the Empress was due to the fact that she had been pressed down by the weight of the Storstad and then by the sudden inrush of water.

Mr. Aspinall stated that if the court had in its final judgment any recommendations to make regarding the safeguarding of passengers so as to prevent similar disasters, he was instructed the C.P.R. would immediately adopt them, and he wound up by thanking Lord Mersey and other members of the court for their courtesy, also Mr. Haight, and he expressed his appreciation of the manner in which he had been aided throughout by E. W. Beatty and A. R. Holden, C.P.R. solicitors.

ELEVENTH DAY'S PROCEEDINGS.

CONTENTIONS that the story submitted to the Empress Wreck Commission by the captain and officers of the lost liner was false, that the present heading of the hull proves the Storstad's owners' convictions as to how the collision took place and that Captain Kendall, unnerved by the appearance of the collier after his steering gear had broken down, lost his head, formed the main part of the address made in the morning session of the eleventh day's sitting, by C S. Haight. He stated that the collier was not blameworthy for the collision, which was caused solely by the Empress being stopped directly in the path of the Storstad.

Mr, Haight made an attack on the evidence which had been given by Captain Kendall, declaring that the fact that he had faced death in the water, lost his ship and over one thousand lives, were not guarantees that he was telling the truth as had been suggested by Mr. Aspinall. In fact they were more than likely to be reasons for him falsifying his story, for what man would be brave enough to face the world and declare that on a clear night when the ships had been sighted and within four miles of shore, he had placed his vessel across the bows of another. There were some serious discrepancies in his story, he continued. These were of value in determining what importance was to be attached to his account of what happened the night the ship was lost.

One Ship to Blame.

"We must confront the fact that one story is accurate and the other is wrong," said Mr. Haight. He claimed that one ship was to blame because a change of seven points in her course had taken place. He brushed aside the theory that the accident was due to a misconception and that both ships were to blame. One ship changed her course in the fog and that was a violation of a rudimentary navigation law which any cabin boy knew, and upon the ship which did that must fall the blame for the tragedy, which was probably the worst in the history of the shipping world.

At the beginning of his address Mr. Haight said that while a ripple of amusement had occasionally passed over the court, its members all realized that they had been engaged in a very solemn task. They had been called upon to find out why two vessels, before the fog shut them out, had been on courses that should have enabled them to pass a mile apart from one another, but had collided, with the result that the Empress had sunk in fifteen minutes and the lives of 1,024 had been blotted out.

Captain Kendall had urged that the captain of the Storstad had changed his course, had rammed his ship, and then had backed more than a mile away. Norway wanted to know if a ship manned by her countrymen had done this thing, which looked to be deliberate from the terms of the charge made. The accident was absolutely inexcusable, and the conduct of the vessel found to have altered her course would be indefensible. No ship could change her course seven points without knowing it. Had the Empress dropped her rudder she might have sheered, but it did not drop. She might not have steered well if she had been by design a poor steering vessel; or her steering gear might suddenly have become damaged.

"The deliberate sheer," he said, "I discount absolutely. I shall never believe that Captain Kendall knowing that the other vessel was on his port bow deliberately turned his fine ship across our

bow, stopped his engines, and waited for us to run him down.''

Empress' Rudder Attacked.

He attacked the rudder of the Empress, declaring that it had been altered after she had made a few trips to sea presumably because she had met with a slight accident, but at the same time the Empress of Britain, which had had no trouble, was changed too. The mistake in design was admitted by the alteration to the rudder by the builders. Then he discussed the evidence offered by the Alden and the pilot of that vessel. They claimed that she, the Empress, had been wandering around the river, and that they were forced to the north shore to avoid a collision.

Mr. Haight said to argue that the Alden crew could not remember what happened on a particular night seemed to him incorrect, as what they had seen would naturally be impressed on their minds by the news of the tragedy. Mr. Haight defended Quartermaster Galway. He said he knew that he went into the box with his evidence discounted in advance as that of a man who was willing to sell himself. The fact that he had given testimony, well knowing that no pieces of silver were to follow it, and the other fact that notwithstanding the severe ordeal of cross-examination and the lash of questions he was subjected to, he had come out of it with his plain facts unaffected. Indeed, Murphy, the other quartermaster, had acknowledged that the wheel had failed to catch, though he had qualified it by saying it happened two years ago. He himself thought that the steering gear was the cause of Captain Kendall adopting the extraordinary measure of going full speed astern when miles away from the Storstad. He thought Galway's story was true.

Lord Mersey—''You must not say that. You must leave that to us to decide.''

Lord Mersey then pointed out that Galway, though he thought so much about the steering gear, had failed to mention its alleged defects in an interview he gave to a Montreal paper.

Why the Empress Went Astern

Mr. Haight continued: '' If the steering gear of the Empress broke down there was an explanation for one of the most surprising movement ever known at sea. He attacked the story of Capt. Kendall that he had put his engines full speed astern from full speed ahead when he met the fog to stop his ship dead in the water. It was utterly impossible to find any one who would believe that he would adopt such drastic measures when the vessels were so far apart and on a safe and clearing course.

''I submit,'' he concluded, ''that there is an explanation to be found for this surprising order if it is true that something had gone wrong with his steering gear. Then an emergency had arisen and there was every reason in the world why the engines should be put full speed astern no matter what the cost to the engines might be. He had not time then to order the 'stop' and later the 'full speed astern.'' There must have been some emergency to make him put his engines full speed astern when the vessels were from two to four miles apart. The inference from the long running whistle obviously was that when she entered the fog the Empress did not go full speed astern at once, as was reasonable with the other ship so far away.

The Angle of Contact.

Mr Haight then discussed the angle of contact and demonstrated by models his contention that for the Storstad to pass away from the Empress to stern and parallel, the liner must have been moving ahead or otherwise the collier's impulse on reversed engines hitting a stationary ship at right angles would have been for her to be drawn away at that angle. He denounced the chief engineer of the Storstadt for running after the collision to the boats instead of to the engines.

The physical facts which Mr. Haight said absolutely proved his contentions were next taken up. He said that according to Captain Kendall's story when the vessel sank she was headed south-east. They had to remember that the ship sank rapidly and could not have got more than a few ship lengths away from where she was hit. What had the divers found? The hull was now pointing north-east, which exactly conformed to the argument of the Storstadt officers that the Empress was on a course north by 39 east. It would require the force of Niagara to turn such a ship round, he said.

Mr. Aspinall Again.

In opening his final argument, Mr. Aspinall said: '' While I differ on many things that Mr. Haight has said, I agree with his opening observation that this is a case where one or other ship was to blame, but not both. Be they red to red or green to green, unless one alters its course these ships would have safely passed either starboard to starboard or port to port.''

Lord Mersey—Is it decided that only one ship can be blamed? Is it not possible that each ship may be partly to blame?

Mr. Aspinall, in reply, said that Mr. Haight had taken the position that only one ship could be to blame, and that also was his position. If the evidence submitted was any way right, the blunder which caused the trouble was committed by one or the other ship. He was, however, prepared to admit the possibility on the part of both.

'' If either I or Mr. Haight establishes his case, it will be that my ship could not have altered its course and his ship could have not altered her course.''

One Side Or Other Lying.

Lord Mersey—Then, if your story is right, it follows logically that the witnesses from the Storstadt are telling deliberate untruths. If Mr. Haight's story is right, it follows that the witnesses from the Empress must be deliberately putting forward a story that they know to be untrue. That seems to be the position. Now, I assume that according to your view there may be a middle course involving both sides in the blame.

Mr. Aspinall—Of course, that is possible; but I submit that your lordships will consider the evidence and that according to law this court is very properly slow to arrive at a conclusion which neither party to the dispute invites the court to come to.

Lord Mersey—You must remember that this is not a legal action; it is an inquiry.

Mr. Aspinall—Yes, my lord; but both sides which are represented by counsel who, I may say, know their business, have set forth in court that it must be either one vessel or the other that is to blame, therefore I would suggest that the court be slow to take a middle course.

Chief Justice McLeod—Our idea is not to blame one or the other or to take a middle course. What we want is to reach a conclusion that will satisfy the public as to the causes of this disaster.

Mr. Aspinall—The whole point at issue has been as to whether one or the other vessel altered its course.

Lord Mersey—And your contention is that the course of the Storstadt was changed so as to produce the collision?

'' Yes.''

Lord Mersey—They say that the course of the Empress was altered so as to produce the collision?

'' Yes.''

Lord Mersey—You say that it is extremely improbable that both changed their courses in such a manner as to cause the collision.

Mr. Aspinall—I submit that that is almost impossible, and that to make a finding to that effect, in view of the manner in which the case has been conducted, would be most unusual.

Mr. Aspinall then said that Mr. Haight had argued that the Empress had altered its course owing to a defect in the steering gear, or a defect in the rudder.

Lord Mersey—I understood his contention to be that for some reason or other Captain Kendall completely lost his head.

Mr. Aspinall—I understand the point of his talk to be: Did the Empress alter its course because the steam steering gear failed or else the rudder?

Proceeding to analyze the evidence, Mr. Aspinall said that Mr. Haight had remarked in his address that if Captain Kendall had failed in his work there was every reason for his lying. "That is strong language, my lord, but his argument is that unless Captain Kendall had failed in his self he can never hold up his head again before his fellow-men. Mr. Haight's contention, however, is that it was not the man who failed, but the ship. Why, then, should Captain Kendall come here and sacrifice himself for the C.P.R.?

"The very manner in which Mr. Haight presented his case entitles me to put forward why, if the ship itself had failed, should not Captain Kendall at once say: 'I did not fail. It was the instrument of the Canadian Pacific that failed.' That is a good reason for refuting the suggestion that steering defects of the ship caused the collision."

"Since her rudder had been altered in 1908," said Mr. Aspinall, "the Empress of Ireland had sailed the Atlantic many thousands of miles. It was inconceivable that if her steering gear had been defective this would not have been brought to the attention of the C.P.R. She would certainly have failed on more than one occasion, and Captain Kendall, for the safety of his own life and reputation as well as the lives of his passengers and crew, must have complained that his ship would not have steered well, especially when navigating the tortuous channel of the St. Lawrence."

Mr. Newcombe Sums Up.

Lord Mersey—Now, Mr. Newcombe, your task begins.

With this brief introduction Mr. Newcombe started his summing up on behalf of the Canadian Government. He opened by remarking that in his opinion the case involved much more important consideration than the Alden and Galway incidents which had been so much dealt with by the other counsel on the case, while his view of the case disagreed in some ways with that of both of his learned friends. He considered that Lord Mersey could make a decision without finding that either of the officers had misrepresented his course. Apparently one or both ships after entering the fog misunderstood the other's movements, while he regarded the fact that the Empress ultimately found the Storstadt on her starboard bow as one of importance.

"I think," said Mr. Newcombe, "that the evidence shows that this was caused by the fact that shortly before the collision the wheel of the Storstadt was ported and then hard ported. Coupled with this is the statement of the man in charge that this move had no effect on the ship's course. It may be that this is true, but it seems to me that your lordships will find it impossible to accept the view that these operations did not affect the course of the Storstadt. So you get a porting of the helm of the Storstadt and the ship answering her helm with the Empress in the position she was shown to occupy, according to Captain Kendall's testimony."

The manner in which the men of the Storstadt gave their testimony as to this porting of the wheel, Mr. Newcombe regarded as much in their favor as to the honesty of their evidence; as, if they had been intending to mislead the court it would have been unnecessary to mention this matter at all, the more so as it was very disadvantageous to their case. Therefore, he submitted that even if the Norwegian sailors were mistaken, they had no deliberate intention to mislead the court.

Mr. Newcombe proceeded to divide the case into two points—first, the navigation which had caused the collision, and, secondly, as to any defects in equipment and its manipulation after the collision.

Whole Case Peculiar.

The whole case, he considered, was most peculiar. The general evidence showed that the vessels had sighted each other about six miles apart and that they had been less than two miles apart when they lost each other in the fog. He did not believe that the Storstad had traveled half a mile out of her course on her hard aport helm. Apparently the Empress was either stopped or was moving very slowly, while the Storstad had way on.

As to the rules, Mr. Newcombe interpreted them to mean that a vessel, having sighted another and then gone into a fog, should not stop but should go slowly.

"If we could only find just where the Empress was when she changed her course from north 47 east to north 73 east, then I think we would be able to solve the riddle of this collision," he said; "but I have no doubt from the evidence that the engines on the Storstad were stopped and she was going very slowly.

Lord Mersey—Might I ask what you are trying to suggest? Is it that neither ship was to blame, or that both were to blame?

Suggested Negligence of Both.

Mr. Newcome—I am suggesting that there was an improper porting of the helm of the Storstad.

Lord Mersey—I thought you suggested you could deal with the case without imputing any false swearing on either side?

Mr. Newcombe—Yes.

Lord Mersey—Do you suggest that the story told by each side is believed by either side? I quite understand negligence upon one or the other side, or upon both.

Mr. Newcombe—I am suggesting negligence upon both sides. Certainly the accident could not have happened if the Empress had not taken this extraordinary course of reversing her engines and stopping almost in the course of the approaching Storstad.

Lord Mersey—Then that the Storstad ported her helm and brought herself up against the side of the Empress?"

Mr. Newcombe—So she did; but I contend that the rule says that the Empress should have gone on at moderate speed, which would have taken her out of the way of the Storstad. Whether the Empress stopped absolutely or not is a matter of good seamanship which must be considered.

The Stopping of the Empress.

Lord Mersey—Then is your argument that in the circumstances Capt. Kendall could properly have kept going?"

Mr. Newcombe replied that his opinion of what the rules demanded was that Captain Kendall should have done so. He further argued that the evidence showed that the Empress went down in the same condition in which she was struck, those water-tight doors which were closed remaining closed, and those which were open remaining open. According to the rules, he considered that a man should have been on duty at each bulkhead door when the Empress entered the fog, and he contended that if this had been done there would have been ample time to have closed them; but even though this had been done, Mr. Newcombe said he was doubtful whether it would have saved the ship.

Lord Mersey—I am of opinion that it would have been more useful for the men at that time to have been getting out the lifebelts and boats.

Could Disaster Have Been Avoided?

Mr. Newcombe—The final question is, could this appalling disaster have been avoided, and if so, how? It is clear from the evidence in this case that there should be arrangements for the immediate closing of bulkhead doors, and the portholes should have been closed. Never again should portholes be allowed to remain open so as to contribute to the rapid sinking of a vessel in collision. In foggy weather and crowded waters the master of a vessel should give orders to the stewards and those below to close all portholes and not allow them to be reopened until the vessel was out of the fog or dangerous waters. When a vessel is in a fog or in crowded waters, it is too

late to wait until after the event to close the doors and portholes.

"My summing up of the case," concluded the Deputy Minister of Justice, "is that the Empress of Ireland stopped near the Storstad, where, if she had followed the rules of navigation, she would have gone on and away from the Storstad. I have referred to the closing of the watertight doors and portholes, and suggested that this points very clearly to a direction from this tribunal that in all cases of risk the watertight doors and portholes should not be allowed to be kept open."

Lord Mersey then briefly expressed his appreciation of the manner in which the various counsel and others concerned in the case had acted, and the case was adjourned "sine die."

"Storstad" Held Responsible for the Disaster

What follows constitutes the finding of the Commission relative to placing the responsibility for the collision. This, together with a previous summary of the evidence supplied by Captain Kendall of the Empress and Chief Officer Tuftenes of the Storstad, was read by Lord Mersey, Chairman of the Commission.

"WE regret to have to impute blame to anyone in connection with this lamentable disaster, and we should not do so if we felt that any reasonable alternative was left to us. We can, however, come to no other conclusion than that Mr. Tuftenes was wrong and negligent in altering his course in the fog, as he undoubtedly did, and that he was wrong and negligent in keeping the navigation of the vessel in his own hands and in failing to call the captain when he saw the fog coming on. It is not to be supposed that this disaster was in anyway attributable to any special characteristics of the St. Lawrence waterway. It was a disaster which might have occurred in the Thames, in the Clyde, in the Mersey, or elsewhere in similar circumstances.

Such is the conclusion at which we have arrived on the question as to who was to blame for the disaster; but the question of much greater public interest and importance remains to be considered, viz., Why the ship sank so quickly, and what steps, if any, can be taken to prevent the terrible consequences which so often follow from such disasters.

The main difference between the two stories is to be found in the description of the way in which the two vessels were approaching each other at the time the Empress of Ireland changed her course after having obtained an offing from Father Point. The witnesses from the Storstad say they were approaching so as to pass red to red, while those on the Empress of Ireland said they were approaching so as to pass green to green.

The stories are irreconcilable, and we have to determine which is the more probable. The times, distances, and bearings vary so much, even in the evidence from witnesses from the same ship, that it is impossible to rely or to base conclusions upon them. We have, therefore, thought it advisable to found our conclusions almost entirely upon events spoken to by the witnesses and upon their probable sequence in order to arrive at a solution of the difficulty.

Tuftenes' Error.

After carefully weighing the evidence, we have come to the conclusion that Mr. Tuftenes was mistaken if he supposed that there was any intention on the part of the Empress of Ireland to pass port to port, or that she, in fact, by her lights manifested the intention of doing so; but it appears to us to be a mistake which would have been of no consequence if both ships had subsequently kept their courses.

Shortly after the ships came into the position of green to green, as claimed by Captain Kendall, or red to red, as claimed by Mr. Tuftenes, the fog shut them out from each other, and it is while they were both enveloped in this fog that the course of one or the other was changed, and the collision brought about. From the evidence adduced on behalf of both vessels, it is plain that before the fog, and when they last saw each other, there was no risk of collision if each kept her course. Therefore, the question as to who is to blame resolves itself into a simple issue, namely, which of the two ships changed her course during the fog?

With reference to this issue it will be convenient to deal with the evidence connected with the Empress of Ireland first. No witness speaks of having seen her make any change of course during the fog, and those who were on board, engaged in her navigation, distinctly deny that any change whatever was made.

Galway's Evidence.

There is, in our opinion, no ground for saying that the course of the Empress of Ireland was ever changed in the sense that the wheel was wilfully moved, but, as the hearing proceeded, another explanation was pronounced, namely, that the vessel changed her course, not by reason of any wilful alteration of her wheel, but in consequence of some uncontrollable movement which was accounted for at one time on the hypothesis that the telemotor steering gear was out of order, and at another by the theory that having regard to the fullness of the stern of the Empress of Ireland the area of the rudder was insufficient. Evidence was called in support of this explanation.

It is not necessary to examine this evidence in detail. The principal witness on the point as to the steering gear was a man named Galway, one of the quartermasters on the Empress of Ireland. He said that he reported the jamming incident to Williams, the second officer, on the bridge (who was drowned), and to Pilot Bernier. He said that he also mentioned the matter to Quartermaster Murphy, who relieved him at midnight of the disaster. Pilot Bernier and Murphy were called and denied that Galway had made any complaint whatever to them about the steering gear. Galway gave his evidence badly and made so unsatisfactory a witness that we cannot rely on his testimony.

Some evidence was called, however, to confirm Galway. This was the evidence of three men and the pilot from another Norwegian collier called the Alden, a boat under time charter to the Dominion Coal Co., who were the charterers of the Storstad. These witnesses spoke of having passed the Empress of Ireland on her way down the river about 9.20 (Montreal time) on the evening of the 28th of May, and they said she was swinging and steering badly, changing from red to green several times. The witnesses do not speak of any behaviour of the vessel which would suggest "jamming," and it is to be observed that the allegation that the vessel sheered from side to side on this occasion is entirely different from the allegation of Galway that the wheel jammed.

On the whole question of the telemotor steering gear and rudder, we are of opinion that the allegations as to their conditions are not well founded. We have consulted our advisers and they concur in this opinion.

Stopping of the Empress.

It was said on behalf of the Storstad that the order to put the liner full speed astern was probably given because the Empress of Ireland had become unmanageable by reason of her defective steering gear. We cannot accept this suggestion, but we do think the stopping evidenced uneasiness on the part of Captain Kendall and a consciousness that his ship was possibly in too close proximity to the Storstad. We think that he would have been better advised if he had given the Storstad a wider

berth, and had navigated his ship so as to pass the Storstad at a greater distance on his beam than he originally intended. We do not think, however, that this stopping, which was really done for greater caution, can be said to have been an unseamanlike act, nor do we consider his failure to give the wider berth as a contributory cause of the disaster.

It is now necessary to consider the position and conduct of the Storstad with the view of ascertaining whether it was she who changed her course. It is admitted that those on board the Storstad did that which in ordinary circumstances would change her course, and that they did it in the fog shortly before the accident. They ported and they hard-a-ported the Storstad's helm. It was further said that, by reason of this current and by reason of the fact that the Storstad had little or no way on her, the porting had no effect on her course, which remained west by south, as it had been for half an hour or more before.

We are unable to accept this view. Mr. Haight, in his statements made to us before any evidence was called, informed us that Mr. Tuftenes, who was in charge of the Storstad, had explained to him that the object of porting the helm was to "make sure of ample room," and this is no doubt true. No current was then mentioned.

Then the character of the damage done to the Storstad's bow (which we have seen) satisfies us that considerable way must have been on her at the time she dealt the blow on the Empress of Ireland's starboard side. Captain Kendall said that at the time of the collision his ship was lying in the water, stopped dead, and that, therefore, no movement of his ship contributed to the force of the impact. This is perhaps doubtful.

We think that, although his engines had been reversed for some minutes, Captain Kendall may be mistaken in supposing that way had been entirely taken off his ship, and it is possible, therefore, that to some extent her movement may have contributed to the force of the blow; but the fact remains that the Storstad ported her helm and changed her course, and so brought about the collision.

No Lack of Discipline.

The report says the crew of the liner appears to have responded readily to the call for boats, but the ship listed so rapidly that only a few on the starboard side of the Empress could be got out. There was no lack of discipline. No complaint could be made of the conduct of those on board the Storstad. They appeared to have done all in their power to save life.

The Empress complied with all the regulations regarding boat equipment, water-tight doors, etc. Attempts were made to close the water-tight doors, but in view of the fact that the only two known attempts to close doors on the starboard side were unsuccessful, it seemed practically a certainty that the other attempts on the side, if made, had a similar result, and that nearly all the water-tight doors on the starboard between main and upper decks remained open after the collision. It is also certain that some ports were open after the collision. The conclusion has been reached that the area below water of the hole made in the side of the Empress of Ireland was, immediately after the collision, no less than 350 square feet.

Evidence received makes it clear that the Empress of Ireland was damaged in the immediate vicinity of the water-tight bulkhead fitted between the two boiler rooms, whilst the stem of the Storstad must have penetrated into the side of the Empress of Ireland sufficiently to destroy the water-tightness of this compartment. The immediate effect of the damage was to place compartments, with a combined length of 175 feet, in communication with the sea allowing an initial inflow of water into the vessel of 263 tons per second. Under the actual conditions prevailing at the time of the collision, however, with the side of the vessel where struck, open to the sea above the main deck, and with bulkhead doors on the starboard side of that deck open, water could find its way freely over the deck, thus wholly destroying the vessel's stability and causing her to capsize and founder.

Suggestions for Future.

1.—In order to prevent, if possible, disasters such as that into which we have been inquiring, we think that in foggy weather it would be desirable to close all water-tight doors and port holes below the top of the water-tight bulkheads, and to keep them closed until the fog has completed cleared. We think also that wherever practicable all water-tight doors and port holes below the above level should be closed at sunset and kept closed until sunrise. Precautions of the kind suggested would have the effect of securing the floatability of the ship in accordance with the intentions of the designer, whereas neglect of such precautions may lead to the foundering of a vessel which would otherwise have remained afloat.

2.—The rapidity with which the vessel foundered after the collision made the life-saving appliances on board of little use. Most, if not all, of the passengers were in bed when the vessel was struck, and there was an interval of only about fifteen minutes between the collision and the foundering. The list which the vessel took to starboard was so sudden and so great that the lifeboats on the port side were rendered useless almost at once. Some of these were, indeed, worse than useless, for they broke adrift and injured people as they clattered down the sloping deck. Of those on the starboard side only six were launched, although the best was done in the short time available to get them into the water.

These circumstances lead us to suggest that it might be desirable to consider whether rafts could not be placed in such a position on the upper deck that they would float automatically on the water as the ship sank. Such rafts would doubtless have to be attached to the deck in such a way as to prevent them from getting adrift in bad weather; but the attachments might be of a simple kind which could be loosened in a very short time.

3.—It has not been suggested during our inquiry that the catastrophe was in any way attributable to the arrangements made by the Canadian Government for the navigation of the St. Lawrence, nor have we any reason to suppose that those arrangements are in any way unsatisfactory; but we suggest that it might be worth while for the Government to consider whether it may not be desirable and practicable to arrange for the picking up and dropping of pilots to be done at different points so that incoming and outgoing ships may, so far as is possible, be relieved of the necessity of crossing one another.

Captain William N. Storey, a veteran of the Canadian Lakes, died in Collingwood on July 18, in his 73rd year. He was born in South Shields, England, and came to Canada when nine years old, settling at Kemptville. When a young man he commenced sailing, and was master of different steamers plying Lakes Ontario and Erie. Thirty-five years ago he came to Collingwood as purchasing agent for the Hamilton & Northwestern Railway, which had then been completed from Hamilton to that port. Later he became associated with the Lake Superior & Chicago Transportation Co., which operated steamers between Collingwood and Chicago and Lake Superior ports. He was also for some years with the Great Northern Transit Co. as purser of the steamer Pacific, and upon the organization of the North Shore Navigation Co. accepted a similar position on the steamer Midland, and afterwards on the City of Collingwood. He was later with the Northern Navigation Co., but ten years ago retired. One of his sons, Harry, is purser of the Northern Navigation Co.'s steamer Noronic.

SCREW PROPELLERS.

MR. P. Y. BRIMBLECOMBE,B.Sc., in an address before the graduate section of the North-East Coast Institution of Engineers and Shipbuilders, in their library at Newcastle, on "Screw Propellers," remarked that screw propellers being a factor of great importance in the propulsion of ships, innumerable calculations had been made and experiments performed with a view to determining their most efficient form. He went very exhaustively, in the course of his remarks, into the theory of propeller construction and work, and gave his audience the benefit of many useful formulae in connection therewith.

He then proceeded to refer to the phenomenon known as cavitation. If, he said, a ship's propeller was worked at gradually increasing revolutions and producing gradually increased thrust, it was found that, beyond a certain point, there must be a marked increase in the number of revolutions required to produce a very moderate increase of thrust —i.e., the apparent slip showed a sudden increase. That had been attributed to the formation of cavities, principally at the back of the propeller blade, so that the propeller was working to some extent in a partial vacuum.

Mr. Barnaby considered that the phenomenon was due to an attempt to produce too large a thrust for the area of the blades, the maximum possible being about 11¼ lbs. per square inch, while Chief Commissioner Taylor, of the American Navy, considered that Barnaby's explanation was incomplete, and suggested that the two main factors in cavitation were the speed of the blade through the water and the shape of the blade section. The former could be conveniently measured by tip speed, and that should be kept as low as possible, consistent with the other factors having reasonable values. The limit of tip speed was about 12,000 feet per minute.

Taylor's view was that the controlling factor in cavitation was the formation of cavities on the front of the face of the leading edge, due to the driving face, which increased with the increase of speed. He, therefore, suggested that the best way to avoid or delay cavitation was to make the blade as wide as possible, so that, if cascading occurred over the leading portion, the water might get back on the trailing portion and deliver its energy as thrust; and the leading edge of the blades should be made as thin as possible, so as to delay or avoid cascading, and, in order to obtain the necessary strength for leading edge, he suggested casting ribs across the blade.

Deeper immersion of the propeller would also assist in eliminating cavitation, as, of course, the pressure of water would be greater. It was very important that a propeller should have sufficient immersion, since, if it broke the surface of the water, its efficiency would be reduced considerably, and the greater the depth of the screw below the surface the less was the chance of its being drawn out of the water by pitching or rolling.

Blade Material.

The materials of which propeller blades were made included cast iron, cast steel, forged steel, and manganese or some other strong bronze. Cast iron was used for the blades of propellers which worked under conditions rendering them very liable to strike against obstructions. When so striking, the cast iron being weak, the blade broke, and by so breaking saved the shafting of the engine. Its disadvantages were extreme corrosion in seawater, heavy blade sections and blunt edges. Cast steel was stronger than cast iron, but had the same disadvantages, although in a lesser degree. Manganese bronze and other strong bronzes appeared to be all that might be wished for in propeller material. They were of high strength, permitting a low ratio of thickness to width of blade, while they could be brought to a sharp edge, and were subject to comparatively little corrosion. They were also cast without difficulty, giving blades free from porosity and blow-holes. They would, however, exercise a strong corrosive action on a steel hull, unless zinc plates were fitted in their vicinity. Hubs were usually made of cast iron or semi-steel for cast iron or cast steel propellers, and of manganese bronze for manganese bronze blades.

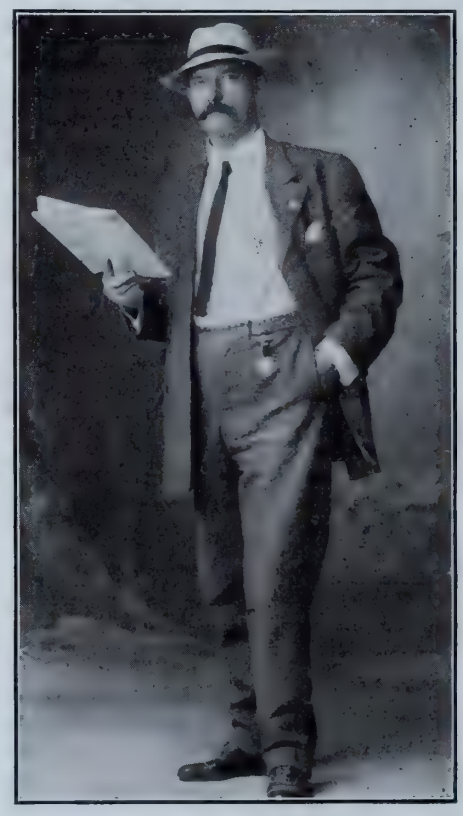
Propeller Efficieency.

The efficiency of a propeller varied inversely as the number of blades—i.e., a propeller with two blades was more efficient than a propeller with three identical blades, but the total thrust and torque increased as the number of blades was increased, although the thrust and torque per blade fell off. In practice, the number of blades was decided by considering the efficiency of resulting propellers, it being remembered that a four-bladed propeller might be smaller than a three-bladed, and hence have a pitch ratio more favorable to efficiency than the pitch ratio of the corresponding three-bladed propeller.

Though there was little direct information on the subject, it was probable that single screws were more efficient than twin screws, and that there was a progressive disadvantage in using triple and quadruple screws. The differences were not large, however, and any type under favorable conditions might be more efficient than others for which favorable conditions could not be secured. The single engine was, of course, simpler and cheaper than two engines with the same power, and, in like manner, two were cheaper than three or four. For moderate powers and speeds, a single screw would be chosen, unless there were distinct advantages, such as handiness or greater security from breakdown. For example, warships all had two screws or more, and turbine steamers had two, three, or four screws, for the better accommodation of the turbine.

A topic which was much discussed amongst laymen was that of a vessel's deviation from a straight course whilst the rudder was kept in a central position. That circumstance was due to propeller action. The speed of wake at the surface of the water was greater than that at the keel—consequently the upper blade experienced more resistance than the lower, and tended to drive the stem round. If the screw was right-handed and did not draw down air, it would tend to cause the vessel to carry a starboard helm in order to maintain a course. If there was air in the wake, caused, for example, by the vessel being at a light draught of water, the effect was reversed, the lower blade predominated, and a port helm must be carried.

WHO'S WHO.



CAPTAIN G. C. COLES.

WHO'S WHO.

THIS month our picture is that of Captain G. C. Coles, who is known to most men connected with marine matters on the Great Lakes, but more particularly, perhaps, by those who have had to go before him to sit for their examination.

Capt. Coles has been in charge of the Dominion Government Marine Office at Collingwood for a number of years. He is a busy man, and one who is keenly interested in all nautical matters. Several hundred of our lake men have obtained their certificates of competency at the examination rooms at Collingwood, and the series of lectures carried on by Captain Coles during the past eight or nine years has met with so much success that without doubt good work is being done. Captain Coles, besides looking after marine matters as mentioned, also inspects vessels on the lakes for inland Lloyds, as well as for the underwriters, and has, we understand, often been called in to adjust losses and hold inquiries. He has also a large general insurance connection. At all times courteous and obliging although a busy man, Captain Coles can be found in his home or office in Collingwood in winter, and during the summer months at his cottage on the shore of the Georgian Bay.

The Collingwood Shipbuilding Co., of Collingwood, Ont., have received orders from the Dominion Government for the construction of a steam hopper barge to cost about $160,000. The boat will be 165 feet long, 35 feet beam and 14 feet deep. She will be constructed of steel throughout and will be propelled by engines of 800 horse-power.

Windsor, Ont.—Before the fall storms set in, the harbor at Leamington planned by the Canadian Government will be ready for use by vessels drawing not more than 25 feet. Soundings are now being made by engineers, and it is expected a breakwater will be built 300 feet out into the lake west of the present dock. If this be done a commodious and safe haven will be provided during bad weather.

Victoria, B.C.—The large wharf which the C.P.R. Co. proposes constructing at Patricia Bay to facilitate the transfering of steel from the freighters chartered for the purpose of bringing it around the Horn from Cape Breton, will be in course of construction in a little over a week. Tenders are now being invited. It is understood that the structure will be completed in October, when the first shipment of material for use on the company's island system will reach here.

Canadian Vessel Captains and Chief Engineers

Through the courtesy of the various Companies, we are enabled to give a list of 1914 season vessels, together with the names of their above-and-below-ship principal officers.

F. E. HALL & CO., MONTREAL.

Vessel.	Captain.	Chief Engineer.
Byron Whitaker	E. Tremblay	A. Theriault
Carleton	E. Groulx	E. Scott
Clyde	W. H. Ransom	M. J. McFaul
Compton	B. Bowen	L. Smith
Robert R. Rhodes	W. C. McLaren	F. A. Collier
Sindbad	J. C. McCarty	J. A. Miller

G. T. P. COAST STEAMSHIP CO., VANCOUVER.

Vessel.	Captain.	Chief Engineer.
Henriette	H. L. Robertson	J. Y. H. Taylor
Prince Albert	W. S. Morehouse	J. Quine
Prince George	D. Donald	I. O. Handy
Prince John	C. W. Wearmouth	A. S. Munro
Prince Rupert	D. Mackenzie	D. G. Ferrier

G. T. R. DETROIT RIVER CAR FERRIES, WINDSOR.

Vessel.	Captain.	Chief Engineer.
Detroit	R. Aikin	H. Lowry
Great Western	M. Bausette	J. Ladds
Huron	A. Baillargeon	A. Cook
Lansdowne	H. Oldenberg	W. Belsom
Transfer	G. Homer	W. Taylor
Transport	W. Norvall	F. Robinson

UPPER OTTAWA IMPROVEMENT CO., OTTAWA.

Vessel.	Captain.	Chief Engineer.
Albert	J. Snowdon	J. Desrochers
Alert	A. Stewart	[illegible] Rouleau
Alex. Fraser	T. Draper	D. McKay
Alexandra	E. Gray	S. Beaudette
C. B. Powell	J. Ellis	J. Razeau
Castor	D. Farquharson	B. Lavoie
E. H. Bronson	J. C. Merchant	L. Boisvert
G. B. Greene	J. Chartier	G. Noel
G. B. Pattee II.	A. G. Smith	J. Hammel
Hamilton	W. J. Toner	R. Spooner
Hercules	P. Leblanc	R. Mashka
Hiram Robinson	J. Ricard	J. Ralston
Lady Minto	F. M. Burns	W. Desrochers
Mink	C. Hutchison	H. Bradley
Pembroke	O. Blondin	H. Latour
Pollux	C. Thrasher	P. Ferrigan
Samson	M. Russell	M. Fournier
Wabis	L. King	D. Tierney

DARTMOUTH FERRY COMMISSION, DARTMOUTH.

Vessel.	Captain.	Chief Engineer.
Chebucto	John Hare	J. Ross
Dartmouth	W. Jennex	C. Shortt
Halifax	C. A. Ozon	A. McLeod
(Extra Officers)	N. W. Allen	C. Pearce

C. P. R.-B. C. COAST SERVICE, VICTORIA.

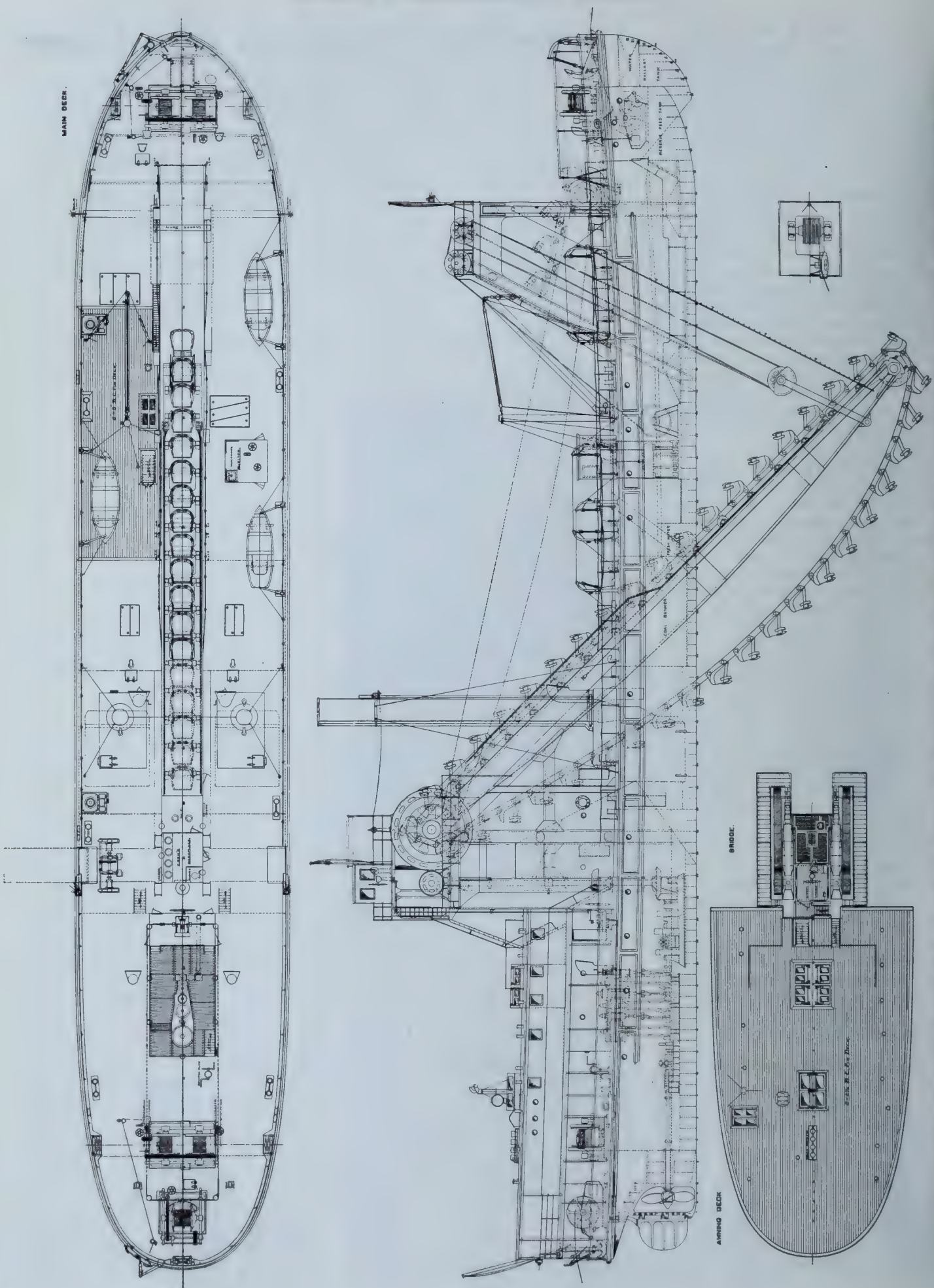
Vessel.	Captain.	Chief Engineer.
Charmer	W. L. Gilchrist	J. M. Greenshields
Joan	S. H. Ormiston	C. H. Waller
Nanoose	F. R. Springall	D. Stewart
Princess Adelaide	R. A. Hunter	T. Moffatt
Princess Alice	L. P. Locke	J. Pettigrew
Princess Beatrice	G. J. Hawes	R. Moffatt
Princess Charlotte	T. O. Griffin	J. A. Heritage
Princess Ena	C. Campbell	R. Coulthard
Princess Maquinna	J. McLeod	J. E. Hill
Princess May	P. J. Hickey	W. Oliver
Princess Patricia	J. Ritchie	W. B. Anderson
Princess Royal	D. Brown	J. Thaw
Princess Sophia	G. D. Robertson	A. Alexander
Tees	E. Gillam	B. J. Osbon
William Joliffe	T. S. Guns	J. Purdey

LEVIS FERRY, LTD., LEVIS.

Vessel.	Captain.	Chief Engineer.
Lauzon	A. Forgues	B. Lapointe
	O. Fortin	A. Langlois
Levis	G. Chamberland	L. Beaudoin
Plessis	N. Thivierge	E. Beaudoin

SINCENNES-McNAUGHTON LINE, MONTREAL.

Vessel.	Captain.	Chief Engineer.
Adolphe V. Roy	J. Goulet	N. Rosseau
Alaska	D. Mongeau	W. Provencher
Aurelie G.	J. Bibeau	J. Laviolette
Denise, S.	J. Millette	F. Thuot
Edouard, G.	P. Aussant	N. Gingras
Emma L.	A. Rajotte	W. Blette
Ethel	U. Latraverse	F. Denis
F. Dupre	G. Mongeau	H. Lagasse
Hudson	C. Legault	Noe Rosseau
John Pratt	I. Beaudry	P. Cournoyer
Mathilda	J. Cournoyer	A. Lemay
Natbalie R.	A. Goulet	G. Heroux
Rival	S. Parisien	N. Lavallee
Rosalie L.	J. Mongeau	H. Beaulieu
Sin-Mac	Z. Legault	A. Barlbeau
Spray	L. Lemay	A. Rousseau
Virginia	P. Bibeau	F. Rousseau
Yvon	J. Bibeau	O. Paul



CANADIAN GOVERNMENT DREDGES, NOS. 14 AND 15, BUILT BY THE COLLINGWOOD SHIPBUILDING CO., COLLINGWOOD, ONT., AND RECENTLY COMMISSIONED.
SEE MAY ISSUE OF MARINE ENGINEERING OF CANADA FOR DESCRIPTION.

RECOGNITION OF PROFESSOR BARNES.

A MODEL of the Tarme ice-breaker, just built by Sir W. G. Armstrong, Whitworth & Co., Newcastle-on-Tyne, has been presented by the Canadian branch of that firm to Professor T. H. Barnes, of McGill University, Montreal, in recognition of the work he has done in studying the ice conditions of the St. Lawrence, and in pointing out the methods by which the Canadian Government could extend the season of navigation materially. The Tarme was built for the Commercial and Industrial Department of the Imperial Senate of Finland, and exemplified all the qualities that have made the Ermack and others of its kind so successful in the Baltic Sea and in the Arctic. The Armstrong, Whitworth Co. of Canada, at 22 Victoria Square, Montreal, had the model presented to Professor Barnes in their window, and inside they have as well a model of the Ermack.

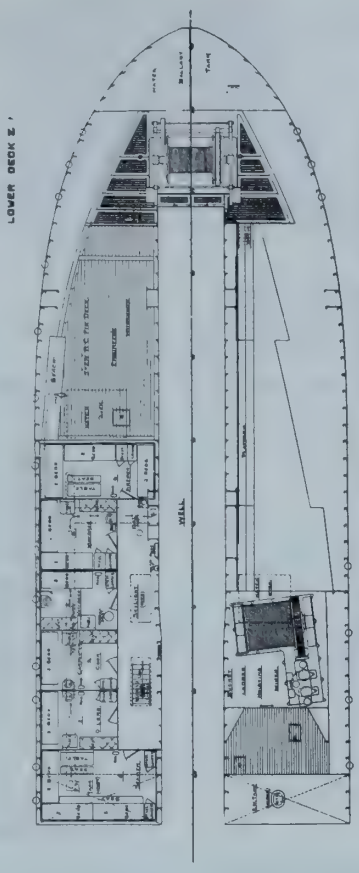
The Ermack has the record of saving about two hundred vessels of an aggregate value of nearly ten million dollars, not including the Russian coast defence armor-clad General Admiral Apraxine, which ran ashore on the Island of Hogland, in the Baltic, just as the ice set in. The Ermack is believed to be the only vessel which could have saved the war vessel under such circumstances. In fact, its builders claim that it can go into any harbor, whatever the ice conditions, and fight itself out in the same way.

New Bow Fitted.

A new bow has just been put on the Ermack, which makes its length 320 feet. It is 71 feet broad, 42 ft. 6 in. deep, and has machinery capable of developing 10,000 horse-power.

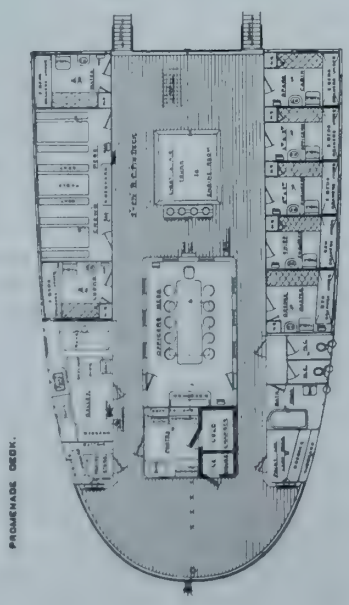
It was originally designed with three propellers aft and one forward. The forward propeller was for the purpose of drawing the water from under the ice as the ice-breaker advanced upon it, thus reducing its resisting power. This system had been found successful on the Great Lakes between Canada and the United States and on similar ice-breakers in the Baltic.

On the Ermack it was successful as long as it remained in the Baltic, but it was desired to send it up into the Arctic circle, where field ice of 12 to 14 feet in thickness had to be negotiated. There the forward propeller was found a hindrance, and as Admiral Makaroff, who was responsible for the whole ice-breaking enterprise, wanted to go as far north as possible, it was decided to make such alterations as would fit her for the work. So about sixty feet of the bow was sliced off, and a new bow 75 feet in length without a forward propeller was added.



LOWER DECK AND HOLD, CANADIAN GOVERNMENT DREDGES, NOS. 14 AND 15.

The whole process of making and fitting on the new bow only took four months. The bow from a point above the water slopes down at an angle of about forty-five degrees, and thus when going through ice the bow hits it with about the same effect as an enormous axe would have. On its first voyage the boat went through ice 25 feet thick, getting nearly through before being brought up by it.



PROMENADE DECK, CANADIAN GOVERNMENT DREDGES, NOS. 14 AND 15.

THE LARGEST STEAMSHIP CO.

THE following are some interesting facts and figures concerning the Hamburg-American Line, the world's largest steamship company. The Deutschland, the original vessel of the fleet, which made its first voyage in 1847, had a tonnage of only 717, in comparison to the Vaterland's 58,000, the company's latest vessel thus being about one hundred times the size of its first passenger sailing ship. In March of this year the total fleet consisted of 439 vessels, with a combined tonnage of 1,360,360 gross tons register. Of these, 176 were ocean steamships in service, 18 ocean steamships under construction (including another mammoth liner of about 58,000 gross tons), and 245 river steamers, lighters, tugs, etc.

At the beginning of 1914 about 16,000 men were in the employ of the company in a nautical capacity and about 9,000 employees are engaged ashore, the aggregate personnel thus exceeding 25,000. Last year the ocean steamships of the company transported 463,571 passengers and 8,297,000 tons of freight, while nearly seven million passengers and ninety-six million tons of freight have been carried since the company's inception. Ocean voyages made by the Hamburg-American Line steamers during 1913 were 2,218, the total distance covered being 8,986,000 nautical miles, equal to 415 times around the world at the equator.

The company at present maintains seventy-four regular services, on which 1,895,000 tons of coal, valued at $9,500,000, were used during last year, and among the provisions consumed were:—Potatoes, 14,698,000 pounds; flour and bread, 8,877,000 pounds; fresh meat, 9,385,200 pounds; coffee, 497,200 pounds; eggs, 5,403,200; beer, 1,969,000 liters and 676,500 bottles; wine, 273,900 bottles.

Old Officers Back on Storstad.—Mr. Finn Koren, Norwegian Consul-General for Canada, is reported to have stated, acording to a Montreal dispatch of July 21, that the balance of the $175,000 bid for the collier Storstad at the sale by the Admiralty Court about two weeks ago would be paid the day following. Ten per cent. of the purchase price was paid at the time of the sale. It is expected the Storstad will resume her coal-carrying business. She may require a new charter, however, as her old charter is said to have been automatically canceled by her collision with the Empress of Ireland. Her officers have been re-engaged by the new owners, including Captain Andersen and Officers Tuftenes and Saxe.

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Vol. IV JULY, 1914 No. 7

PRINCIPAL CONTENTS.

THE EMPRESS-STORSTAD COLLISION.

WHETHER the judgment rendered by the Commission appointed to investigate the circumstances which brought about the disastrous collision between the Empress of Ireland and the coal freighter Storstad is one to satisfy the public and those more immediately concerned, blamed or otherwise, it is a moot point, and one on which there is little likelihood of anything very definite ever being evolved.

Throughout the evidence and in the final imputation as to the cause of the collision, it is highly satisfactory to note that our great waterway, the St. Lawrence River and Gulf was in no sense contributory. It was abundantly clear from the beginning of course even to the most uninitiated and those engaged in their navigation, consequently there was no need to offset any stigma which otherwise would have been added to an already all too discriminated-against route.

Irrespective altogether of the evidence submitted and the Commission proceedings, because previous to these, yet easily apparent from them, a decided bias in favor of the Empress of Ireland being an innocent participator in the collision was generally shown. Sentiment, because of a fine ship being hurried to the bottom of the St. Lawrence, and because of the snuffing out of over 1,000 lives in as many seconds; but sentiment still more expressive because a coal freighter was the other party has been, ever since the news of the disaster got abroad, a powerful factor.

Whether the opposing counsel, those appearing on behalf of the Empress and Storstad respectively, shone in their efforts to satisfy the public as to the cause of the tragedy, or otherwise, they at least put up a determined fight on behalf of their clients, so much so as to declare point blank that one or other of the vessels, and impossibly both, brought about the collision.

To our mind, the only man in the whole Court personnel who had a real grip on the question was the Canadian Deputy Minister of Justice, Mr. Newcombe, and any satisfaction and credit of performance, and in the long run desperately little will be available, is that gentleman's due. No Court of Inquiry, no matter its setting in this old planet of ours will ever make people believe otherwise than if one ship was to blame, so was the other.

The suggestion by the Court that Captain Kendall should have given the Storstad a wider berth, although couched in language void of reprimand is full of meaning, and whether his action in going astern to stop his ship dead is thought unseamanlike or otherwise, there is little doubt as after events showed that the porting of the Storstad's helm, effective in changing her course or otherwise, a circumstance not fully, if proved at all, would have been no factor, because there would have been no collision, unless the collier had set herself to chase the Empress.

An extraordinary precaution, such as going astern from ahead, to stop a ship dead when entering a fog, should have called for the far more important precaution of not only ordering all watertight doors closed, but of the assurance that they were closed, although the nearest approach of danger was a few miles off. Blowing of a syren is after all, although a requirement, only an advice of a presence, and not a protection. We are therefore glad to note that among the recommendations there appears that which refers to the closing of watertight doors. These useful accessories of vessels, passenger and freight, we always understood were installed against an emergency, and not to combat it when materialized.

The price we mortals have to pay for progress is in every case a heavy one, involving as it does widespread grief, blasted hopes and always more or less temporary disorganization, but our civilization has got to that stage at which every lesson taught is appropriated, and given practical effect to in order to prevent a recurrence of some similar disaster.

There will undoubtedly be given a considerable impetus to the now initiated double-skinned ship, at least so far as our large passenger liners are concerned, and while in the nature of things the elimination of those not now so constructed will take some years to compass, it will be found that our Canadian passenger fleets of which we are justly pround will be those to set the pace.

MARINE NEWS FROM EVERY SOURCE

New Westminster, B.C.—The municipality of Richmond are considering the purchase of a dredge.

London, Ont.—Work was begun on July 8 on the construction of the West London breakwater, for which the citizens voted in January last.

Assiniboia On Run Again.—The C.P.R. steamer Assiniboia, which was in drydock at Collingwood, Ont., since running aground in Georgian Bay, July 1, is again on her run.

Suez Canal.—It is officially announced that from and after January 1, 1915, the maximum draught of water allowed to ships going through the Suez Canal, which is at present 29 ft., will be increased to 30 ft.

Port Arthur, Ont.—A section of the C. N. R. steel dock. about seventy feet square, and containing about 3,120 tons of steel rails, collapsed a few weeks ago. The dock is practically new, having been built only three years ago, and it is believed that the accident was due to defective timbers.

Sarnia, Ont.—The Reid Wrecking Co., has purchased the stranded steamer Howard M. Hanna at 35 per cent. value. The Hanna went aground at Point Aux Barques last November. Several weeks ago the Reids started salvage work on the boat, under contract with the underwriters to deliver her at the nearest port for 65 per cent. of her value.

Kingston, Ont.—Negotiations are on foot for the purchase of two of the Calvin Co.'s steamers, the India and the Simla, by the Montreal Transportation Co. It is expected that the deal will be put through in the course of this month. Both steamers were built at Garden Island. The steamer Simla was built in 1903 and the India in 1899.

Charlottetown, P.E.I.—The Government cable ship Tyrian left on July 3, to lay a new four-core cable for the Western Union between Cape Traverse and Cape Tormentine. This will be the only four-core cable so far in operation anywhere. It was intended to lay it sooner, but the work was held up owing to protests from the lobster fishermen that it would interfere with their catch.

Sault Ste. Marie, Ont.—Twenty-five thousand dollars was paid into the treasury of Sault Ste. Marie on June 30 by the Lake Superior Drydock & Shipbuilding Co., as the final payment for the drydock site here. Construction operations are expected to start very soon. The estimated cost of the construction of the plant, when completed is $1,500,000.

Toronto, Ont.—A second scow, to be used in connection with the Toronto harbor development scheme, was launched at the Polson Iron Works on Saturday, July 11. The scow, which weighs one hundred tons, is to be used for placing piles in position, and will be equipped with a powerful pile-driver and derricks. The machinery for the scow will be fitted immediately.

Toronto, Ont.—Two of the lighters designed and constructed for the Department of Railways and Canals left Polson's Iron Works on July 14 for Port Nelson, on Hudson Bay. The journey is over 4,000 miles, and when the boats reach their destination they will be used for lightering ocean-going vessels which draw too much water, to allow them to discharge cargoes at the present wharf.

Accident to Garden City.—While entering the piers at Port Dalhousie at 2 o'clock on the morning of July 19, the steamer Garden City, while passing the Port Colborne, struck one of the piers, smashing in a paddle box and breaking off a couple of floats. She was obliged to cancel her trip to Toronto in the morning, but went over during the afternoon under her own steam for repairs.

Collingwood, Ont.—The drydocking here on July 4 of the C.P.R. steamer Assiniboia, which was ashore at Bad Neighbor Rock, at the entrance to the Georgian Bay, revealed the seriousness of her condition. The stem was twisted and bent off to an angle to port, while the steel plating was torn asunder and punctured for probably fifty feet back. About 25 plates in all had to be replaced.

Owen Sound, Ont. — The weather bureau opened its new wireless storm-warning service to vessels on the Great Lakes on July 15. The distribution of warnings will be made from the naval radial station at Radio, Va., in the forenoon of each day. The Great Lakes will be divided into upper and lower sections. Warnings will be in ordinary language, and will cover 24 hours from time of issue.

Collingwood, Ont.—Capt. W. G. Cox, master of the Northern Navigation Co.'s steamship Majestic, died on board his vessel on July 15, while passing from Killarney to Parry Sound. Captain Cox, who was 45 years of age, was a son of William Cox, of Collingwood, and had sailed the lakes since boyhood. He has had charge of different steamers of the Northern Navigation Co., including the Germanic, Saronic, and Majestic.

Winnipeg Man Buys Steamer.—The Pittsburgh Steamship Co. on July 8 sold the steamer Britton to E. A. Woodward of Winnipeg. The price was not given out. The steamer will be operated in the grain trade. She has been turned over to the new owners at Duluth. Some repairs will be made before loading grain at the head of the lakes. The Briton was built at the old Globe Yard, Cleveland, in 1891, and was one of the oldest steamers of the Pittsburgh Co.'s fleet.

Montreal, Que.—The steamer Princess Margaret, the six-thousand-ton steamship of the Canadian Pacific fleet, and the latest addition to the company's Pacific coast service, was successfully launched on June 24, at Dumbarton, Scotland. The christening ceremony was performed by Mrs. Rene Redmond, formerly Miss Marguerite Shaughnessy, daughter of Sir. Thomas Shaughnessy. The new boat will be ready to start in about ten weeks' time on her voyage to British Columbia.

Ottawa, Ont.—A new means of transporting western grain and coal is planned in the survey of the Saskatchewan River which is to be completed this autumn by engineers of the Public Works Department. The idea is to have a waterway from the Rockies to Winnipeg sufficient for barge traffic. The cost is roughly estimated at fifteen million dollars, the principal items being a series of locks along the river. The total cost will be reduced by valuable water powers to be developed along the route.

Toronto, Ont.—At the Polson Iron-works on July 25 a 100-ton derrick scow is to be launched for the Canadian Stewart Co., for use in connection with the harbor improvements. The scow will be used principally for the laying of concrete blocks and steel for pier construction. The new steel scow is 120 feet in length, with a 43-foot beam and a depth of 12 feet. When engaged in lifting operations she is supported by four "spuds," similar to those which are fitted to each corner of a dredge.

Goderich, Ont.—The last concrete work on the 1,000-foot extension to the North-westerly breakwater was completed on June 23, the contractor's men having made a record run since sinking the first of four pontoons late in May. It is hoped the Department of Public Works will call for tenders as early as possible for the 800-foot extension to the south-westerly breakwater, as with the closing of that gap to about 400 feet the entrance would be fairly complete and the harbor easy of access in any gale.

Freight Traffic Decreased. — Another heavy decrease in Great Lakes traffic is shown by the statistical report of commerce through the American and Canadian canals at Sault Ste. Marie, for the month of June. The total freight movement of 8,588,081 tons is 3,525,532 tons below the total for June, 1913. Vessel passages for the month were 2,805, with a registered net tonnage of 6,665,134, as compared with 3,414 vesels of 8,640,442 tonnage, last year. The volume of freight handled through the Canadian waterway was 720,000 tons greater than shipments by the American route.

Discovered Dangerous Shoal. — The United States lake survey steamer Col. J. L. Lusk, recently engaged in surveys and examinations in the vicinity of Marquette and Presque Isle harbors, Lake Superior, reports the discovery of an uncharted shoal lying 110¾ degrees south 69¼ degrees east, 1,250 feet from the center of the largest and most northerly of Presque Isle point rocks. This obstruction is a small-sized pinnacle rock, rising out of deep water to within 11½ feet of the surface. Being in an outlying position near a sailing course, it constitutes a dangerous menace to navigation.

Goderich, Ont.— Mr. Anderson, in charge of the installation of the new fog-whistle is making good progress, The compressed air tank has been located on the breakwater and the beacon tower raised some twelve feet higher, which permits construction of sufficient housing to contain the electric motor and compressor which will operate the horn. Heavy armored cable is being run from the town power house to the motor on the breakwater, with a switch or starting station on the south pier. When this is completed a vessel will be able to get an exact bearing on the ranges and feel its way into the harbor in any density of fog.

Ottawa, Ont.—The rather unusual expedient of forwarding a Government boat by train is being resorted to in the case of the George H. Bradbury, the new boat to be used for departmental services on Lake Winnipeg. The Bradbury has been built at the marine yards at Sorel, and is being shipped west in sections. The parts will be reassembled and erected at Selkirk under the direction of the marine superintendent from Sorel.

Halifax, N.S.—With Captain Anderson and a large staff of assistants from the Hydrographic Department, Ottawa, the survey steamer Acadia sailed on July 6 for Hudson's Bay. The steamer will make her first stop at Cape Chidley, making surveys of Hudson's Straits. The steamer Sheba, from Sunderland, Eng., which has been purchased by the Canadian Government, has arrived here. She will be used to transport men and material to Port Nelson.

Ottawa, Ont.—The preparations for the commencement of the inquiry into the commercial feasibility of the Georgian Bay Canal are being made by W. Sanford Evans, chairman of the Georgian Bay Canal Commission. Mr. Evans was recently in Ottawa for the purpose. Information of a statistical character in regard to a variety of subjects which come within the scope of the commission's investigation is now being collected, and compiled by the staff. It includes much information as to existing railway freight rates along the route, with which the canal will supply competition. Evidence will not be taken from witnesses for some weeks yet.

Marine Insurance Losses.—According to a return issued by the Liverpool Underwriters' Association, the estimated loss occasioned by the more important casualties in May was £792,500, including half a million pounds sterling, the insurance value of the Empress of Ireland. This brings the total for the year so far up to £2,287,500, as compared with £3,276,000 in the corresponding period of the previous twelve months. Between January and May there have been 2,628 accidents of all kinds to vessels of 500 tons gross and upwards, collisions being responsible for 887, strandings for 667, and weather damage for 540. No fewer than 119 ships, aggregating 237,611 tons, were totally lost.

Montreal, Que.—In order to minimize the dangers of collision on the narrower reaches of the St. Lawrence, arrangements are now being made by the Department of Marine and Fisheries to practically double-track the channel from Pointe Aux Trembles down to the entrance to Lake St. Peter. Already part of this work is completed, and surveys are now being made to carry it on, so that by next season it is hoped it will be finished. This work is being done in the way of dredging two separate channels all the way down to the lake, one to be used by the smaller class of vessels, with a draught of less than fifteen feet, while the main channel will continue to be used by the Atlantic liners and other vessels of heavy draught.

Victoria, B.C. — Permission having been secured from the Dominion Government, the management of the Victoria & Sidney Railway announces that work will be started forthwith on the construction of a new wharf at Bazan Bay. The expenditure involved totals about $10,000. For many months it has been considered that the present docking accommodation at Sidney was unsatisfactory because of its exposure to the worst storms of that part of the coast. The new structure is at a point which is well protected. It will be somewhat larger and more modern than the present wharf, being designed specially to handle the freight barges which are used in transferring goods in carload lots from the Lower Mainland to this city.

Fort William, Ont.—A movement is on foot in this city to organize a new Steamship Company to operate between Fort William, Montreal and intermediate points. The Company is backed by prominent Duluth vessel owners. Negotiations are under way for the purchase of five vessels. The head office of the new Company will likely be established at Fort William, and the capitalization is to be around the $2,000,000 figure. Further particulars of the new organization will be forthcoming in the immediate future, but just at present the names of those most interested are withheld. The organization of such a company will undoubtedly add to the importance of the Canadian Merchant Marine.

Sault Ste. Marie, Ont.—Much progress has been made at the new third lock at the Soo, and the lock officials believe it will be ready for business on September 1. Water has been turned into the approaches at both ends, and only the finishing touches remain to be given to the entrance channels. Since the new lock can accommodate two of the largest ships on the lakes at one lockage, it is believed there should hereafter be little need for an American ship to go through the Canadian lock. As the depth of the new lock will be twenty-five feet, for a time at least there will be no worry over danger of overloading. Masters of

vessels are eagerly awaiting the opening of the new lock. A year later a new fourth lock may be ready for business.

British Home Fleet Review.—The British home fleet, composed of over 200 fighting ships and an equal number of auxiliaries, including submarines, torpedo-boat destroyers and sea planes, was led out to sea by King George on the morning of July 20. His Majesty was on board the Royal yacht, accompanied by the Prince of Wales, Winston Spencer Churchill, and the other Lords of the Admiralty. At the entrance to the English Channel the Royal yacht dropped anchor, and the ships in line abreast passed in review before His Majesty, while a fleet of sea-planes from the Calshot airship station flew in pairs above the Royal yacht and circled about the slowly-moving ships. It took the great fleet two hours to pass before the King.

Hall Engineering Works.—A strong bid was made recently for the purchase of the Hall Engineering Works, Montreal, by one of the largest British shipbuilding firms, but the offer though substantial was not sufficient to induce Mr. Thomas Hall, the owner, to part with the property which is the largest privately owned ship repairing plant in the Dominion. The works situated on Jurors street were established some ten years ago by Mr. Hall, who was formerly superintendent engineer for both the Canadian Pacific and Elder Dempster Companies in London, Eng. They have grown to a considerable extent since then, being now valued at a quarter of a million. This business-like plant handles most of the large marine repair work at the port of Montreal, as well as a good deal of land work.

Claims Against Storstad.—In the two-million-dollar suit by the C. P. R. against the Storstad for damages arising from the sinking of the Empress of Ireland, the plaintiff, in the statement of claim filed on July 17 with the Admiralty Court, Montreal, makes the following allegations:—That a bad look-out was kept on the Storstad; that the helm of the Storstad was improperly ported; that the Storstad improperly failed to keep her course; that the Storstad was navigated at an improper and immoderate rate of speed; that those in charge of the Storstad failed to reduce speed and sound the whistle before the vessel ran into the fog; that the engines were not slowed, stopped or reversed in time; that no competent officers were on duty on the Storstad and those in charge neglected to comply with the articles of the rule-of-the-road in force in Canadian waters.

Ottawa, Ont.—The Canadian Government has made an offer to the British Admiralty to send the Rainbow up to Behring Sea to carry on the British share of the international patrol, following the sealing convention. The two Admiralty ships which would otherwise have taken part in the patrol, the Algerine and the Shearwater, have been sent to the coast of Mexico for the protection of British interests there. The Admiralty has accordingly accepted the Canadian offer, and the Rainbow will leave the Pacific Coast for Behring Sea at the end of July. The crew will be brought up to strength by additions from the Niobe and a few from the Admiralty. Commander Hose, R.C.N., will be in command. The Rainbow has a sheathing of wood, and is thus specially suited for work in northern waters, where she will spend the summer

The Dominion Government have placed orders for supplies for the Departmental Dredging Branch during the fiscal year 1914-15 as follows: for Prince Edward Island—chain, W. H. Thorne & Co., St. John, N.B.; hose, Geo. T. Polly, St. John, N.B., and the General Supply Co., of Canada, Ottawa; oils and greases, the British American Oil Co., Ltd., Montreal; paint, paint oils, etc., R .C. Jamieson & Co., Montreal; Manila rope, Consumers' Cordage Co., Montreal; wire rope, Poole & Thompson, Montague, P.E.I.; steam pipe, valves and fittings, the Canadian Fairbanks-Morse Co., St. John, N.B. The supplies were ordered for Ontario and Quebec as follows: chain, Lewis Brothers, Ltd, Montreal; hose, the Canadian Fire Hose Co., Montreal, and the Builders' Supply Co., Ottawa; oils and greases, W. F. Kelly Oil Co., Kingston; paint, paint oils, etc., the Ottawa Paint Works, Ottawa; Manila rope, Consumers' Cordage Co., Montreal; wire rope, Drummond, McCall & Co., Montreal; steam pipe, valves and fittings, Empire Mfg. Co., London, and Samuel Fisher, Registered, Montreal. For Nova Scotia and New Brunswick, orders were given thus: chain, Norman S. Sancton, St. John; hose, Estey & Co., St. John; oils and greases, the British American Oil Co., Montreal; paint, paint oils, etc., R. C. Jamieson & Co., Montreal; Manila rope, Consumers' Cordage Co., Montreal; wire rope, the General Supply Co., of Canada, Ottawa; steam pipe, valves and fittings, the Canadian Fairbanks-Morse, Ltd., Montreal.

Halifax, N.S.—None of the three vessels which went ashore in the vicinity of Scattarie Island, off the eastern coast of Cape Breton, during the storm of Saturday and Sunday, July 18 and 19, can be saved, according to advices received. Although the crews had some difficulty in reaching shore, no lives were lost. The holds of the Norwegian steamer Ragna, which ran on the reefs at Balene, near Louisburg, are full of water. The Ragna, which registered 1,050 tons, was bound from Chester, Pa., for St. Annes, C.B., in ballast. The decks of the steamer Cienfuegos, stranded on Scattarie Island, were awash. The Cienfuegos, owned by the Diamond Post Steamship Co. of New York, and flying the Cuban flag, had on board a cargo of hard pine from a Gulf port for Montreal. She registered 1,130 tons. Her crew was rescued by a lifeboat from the East Light Life-saving Station. The American three-masted schooner Harold C. Beecher was reported breaking up on the reefs off Scattarie Island, on July 20. The Beecher was carrying a cargo of sand from New York for Sydney. Captain Corey's wife was making the trip with him. At the other extremity of Nova Scotia, the four-masted schooner Clarence H. Venner, which was bound from New York for Halifax with coal, has gone to pieces on the ledges off Cape Sable Island. An hour after she struck there was no sign of her hull above water. The members of the crew were cared for at the Cape Sable lighthouse.

Another Submarine Bell Authorized.—Instead of being placed at Cape Beale, as formerly announced, the third submarine bell, authorized by the Dominion Government for points on the British Columbia coast, will be established off Clo-oose, on the west coast of Vancouver Island. The establishment of this submarine bell has been authorized by the Department of Marine and Fisheries, and will be placed in position on or about September 1. Submarine bells have already been established at Point Grey, Gossip Reef and Plumpers Pass, and are said to be working satisfactorily, although few ships plying in these waters are at present equipped with receiving apparatus. With three of these important aids to navigation in operation, the entrance to the Straits of Juan de Fuca and the Gulf of Georgia will be well protected with submarine apparatus, but it is expected that more of them will be established as soon as the departure is warranted. Several of the larger liners operating to Victoria and Vancouver are fitted with submarine signalling apparatus, the Royal Mail liner Carnarvonshire being one of the most recent arrivals so equipped. The system is becoming more universal and, as the cost of installation is comparatively small, it is expected that all steamship companies will decide to equip their vessels with this modern safety device. Clo-oose, where the newest submarine bell will shortly be established, is about tweny miles to the south of Cape Beale, where the Department first planned to establish the apparatus. The southerly point was considered to be the better location, and will just as easily be picked up by Transpacific steamships making the entrance to the Straits.

ASSOCIATION AND PERSONAL

A Monthly Record of Current Association News and of Individuals
Who Have Been More or Less Prominent in Marine Circles

Captain Thomas Reid and his wrecking crew have successfully floated the Howard M. Hanna, which went on the rocks at Point Aux Barques in the storm of November 9, 1913.

Captain James McAllister, who for the past five years, has been harbormaster at Fort William, Ont., died on July 6. The late captain was born in Hamilton, Ont., in 1860, and had spent his life since boyhood sailing the Great akes.

Thomas Long, of Toronto, vice-president of the Collingwood Shipbuilding Co., has been created a Knight of the Order of St. Gregory the Great by the Pope. This is a lay order and the recipients are honored for extreme friendship to the church.

Lieutenant Owen Lewis, R. N. R., who has been commander of the Royal Mail Steam Packet Chignecto since she has been engaged in the service between Halifax and the West Indies, has been recalled by his company to take command of one of the R. M. S. P. Co.'s trans-Atlantic liners.

Captain Luther Donnelly, brother of John Donnelly, president of the Donnelly Wrecking Co., Kingston, Ont., died in the General Hospital on July 19 of acute Bright's disease, aged thirty-nine. Deceased, like his father and brothers, followed the marine business all his life.

William Murray Denny, second son of Sir Archibald Denny, Bart., of the shipbuilding and engineering firms of William Denny Bros. and Denny & Co., Dumbarton, Scotland, died at Hamilton, Ont., recently of pneumonia. The deceased had made fruit farming a special study, in preference to shipbuilding. His body was cremated and his ashes sent home.

LICENSED PILOTS.

River St. Lawrence.—Captain Walter Collins, 43 Main Street, Kingston, Ont.; Captain M. McDonald, River Hotel, Kingston, Ont.; Captain Charles J. Martin, 13 Balaclava Street, Kingston, Ont.; Captain T. J. Murphy, 11 William Street, Kingston, Ont.

River St. Lawrence, Bay of Quinte, Murray Canal.—Captain James Murray, 106 Clergy Street, Kingston, Ont.; Capt. James H. Martin, 259 Johnston Street, Kingston, Ont.; John Corkery, 17 Rideau Street, Kingston, Ont.; Captain Daniel H. Mills, 272 University Avenue, Kingston, Ont.

ASSOCIATIONS

DOMINION MARINE ASSOCIATION.
President—James Playfair, Midland; Counsel—F. King, Kingston, Ont.

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Chairman—W. F. Wasley, Gravenhurst, Ont.
Secretary—Jas. Morrison, Montreal.

INTERNATIONAL WATER LINES PASSENGER ASSOCIATION.
President—A. A. Heard, Albany, N.Y.
Secretary—M. R. Nelson, New York. .. ....

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President—A. A. Allan, Montreal; Manager and Secretary—T. Robb, 526 Board of Trade, Montreal.

SHIP MASTERS' ASSOCIATION OF CANADA.
Grand Master—Capt. J. H. McMaugh, Toronto, Ont.; Grand Secretary-Treasurer—Capt. H. O. Jackson, 376 Huron St., Toronto.

GRAND COUNCIL, N.A.M.E. OFFICERS.

L. B. Cronk, Windsor, Ont., Grand President.
A. F. Hamelin, Montreal, Que., Grand Vice-President.
Neil J. Morrison, P. O. Box 238, St. John, N.B., Grand Secretary-Treasurer.
E. Read, Vancouver, B.C., Grand Conductor.
A. J. Ross, Halifax, N.S., Grand Doorkeeper.
James Gillie and A. E. Kennedy, Kingston, Ont., Grand Auditors.

H. Foster Chaffee, passenger traffic manager of the Canada Steamship Lines, has resigned on account of ill-health. His resignation takes effect at the end of the navigation season.

Lord Mersey, chairman of the Empress of Ireland Wreck Commission, accompanied by Prof. Welch and Commander Gayborne, assessors on that body, left Canada for Liverpool on the Allan liner Calgarian on July 16.

Captain George Scagel, present master of the yacht Sigma, has been appointed harbor master at Fort William, Ont., to succeed the late Capt. McAllister. Captain Scagel has been in command of vessels at the head of the lakes since 1895.

Windsor, Ont.—The Dominion Government has just completed a new 655-ft. cement wharf here at a cost of approximately $60,000, and has begun the erection of a reinforced cement warehouse on it at a cost of $10,000

The Polson Ironworks, Ltd., Toronto, on July 18, launched the 24-in. suction dredge "Cyclone," built to the order of the Canadian Stewart Co., for work on the Toronto harbor improvement. The dredge is 170 feet long by 42 feet beam by 12 feet deep, and was christened by Miss Evelyn Cox.

Montreal, Que.—An elevator with a capacity of two million bushels is likely to be erected in the port of Montreal at an early date. It is understood that plans are being made for the erection of another huge concrete structure to relieve the congestion which is apparent in the port every summer. The new elevator will be an addition to No. 1, the elevator near the White Star wharf. It will give No. 1 a capacity of over 4,500,000 bushels.

Directory of Subordinate Councils for 1914.

Name.	No.	President.	Address.	Secretary.	Address.
Toronto,	1	Chas. M. Arnott,	94 Hanley Street,	A. J. Fisher,	641 Bathurst St., Toronto.
St. John,	2	Wilmot Pitt	Indiantown, P. O.,	G. T. G. Blewett,	36 Murray St., St. John, N.B.
Collingwood,	3	W. T. Rennie,	Collingwood,	Robert McQuade,	P. O. Box 97, Collingwood.
Kingston,	4	S. M. Murray,	20 Rideau St.,	James Gillie,	101 Clergy St., Kingston, Ont.
Montreal,	5	A. F. Hamelin,	3210 Le Tang Street,	O. L. Marchand,	2378 Clark St., St. Vincent de Paul, P.Q.
Victoria,	6	John E. Jeffcott,	Esquimault,	Peter Gordon,	808 Blanchard St., Victoria, B.C.
Vancouver,	7	Andrew T. Roy,	3812 18th Ave., W.,	E. Read,	Room 8, Jones Bldg., Vancouver, B.C.
Levis,	8	Michael Latulippe,	Lauzon,	S. G. Guenard,	Bienville, Levis, P.Q.
Sorel,	9	John Matte.	Sorel,	Al. Charbonneau,	P. O. Box 132, Sorel, P.Qa.
Owen Sound,	10	Wallace Robertson,	1030 4th Ave. West,	James Nicoll,	714 4th Ave., Owen Sound, Ont.
Windsor,	11	Alex. McDonald,	28 Crawford Ave.	Neil Maitland,	221 London St., W., Windsor, Ont.
Midland,	12	Jos. Silverthorne,	Midland,	Jno. A. Murphy,	Midland, Ont.
Halifax,	13	Robt. Blair,	29 Preston Street,	Chas. E. Pearce,	Portland St., Dartmouth, N.S.
Sault Ste. Mari	14	A. E. Lewis.	Box 563, Soo, Ont.,	Geo. S. Biggar,	43 Grosvenor Ave., Sault Ste Marie.
Charlottetown,	15	J. F. McGuigan,	38 Queen Street.	Lem Winchester,	302 Fitzroy St., Charlottetown, P.E.I.
Twin City,	16	Wm. Faloona,	392 Ambrose Street,	Lloyd Williams.	142 Secord St., Fort William, Ont.

The advertiser would like to know where you saw his advertisement—tell him.

CONFLICTING HELM ORDERS.

THE Imperial Merchant Service Guild have received an important communication from the British Board of Trade, who invite their opinions on a recommendation made at the last International Conference on safety of life at sea regarding the adoption of a uniform system of helm orders in the different maritime countries. It appears that the representatives of foreign nations favor ar international system of helm orders, and they do not approve of the British system, which is directly opposite to that followed in other countries.

It seems that foreign countries are not yet agreed as to what particular practice should be followed, but they are united in thinking that the British system is unsuited for use under modern conditions. It has been urged by the British delegates that the British system involves the practice of seamen which could not in the ordinary course be altered without very strong reasons for doing so, and any attempt at a sudden change would involve risk of confusion and danger, and should only be introduced after full consideration and discussion.

The British delegates felt that the matter demanded the most careful consideration, and it was promised that it would be placed before the representative associations of shipowners and shipmasters and officers in Great Britain in order that it might be considered in all its bearings.

STORSTAD SOLD FOR $175,000.

THE collier Storstad has been sold for $175,000 in the Admiralty Court, the purchaser being C. Cornell, representing the Prudential Trust Co. It is understood that a Norwegian company has bought the vessel, but further than this Mr. Cornell refused to say, except that the company was acting for "Norwegian shipowners."

The only two bidders were Thomas Hall, of the Hall Engineering Works, Montreal, and Mr. Cornell. The bidding was brisk, and W. G. Marson, the bailiff of the Superior Court, had to use but little of the conventional auctioneer's patter. Starting at $100,000, the bidding went up by $500 bids, to the minimum fixed by the sale, $123,500, that sum being offered by Mr. Cornell.

From there Mr. Hall "jumped" his rival to $130,000, when the bidding advanced in amounts of $5,000 to $165,000, Mr. Cornell's bid.

Here there was a slight pause.

"There are some people outside the room," said Mr. Marson, "perhaps they would like to bid?"

"These are only newspaper men," said Simpson Walker, registrar of the court.

After some hesitation, Mr. Hall bid $168,000. From $170,000 the figures went to 171, 172 and 174 thousand dollars.

"Come on," said Mr. Marson, "that's no price for a ship!"

Finally, Mr. Cornell made the final bid of $175,000, and Mr. Marson announced that the ship was sold.

It was a quiet little group that attended the sale, and there was little of the chaff usually prevalent at affairs of that sort.

Those present were the attorneys for the C.P.R. and the Storstad, several shipping men, Mr. Koren, the Norwegian Consul, and George D. Davie, of the Davie Ship Repairing Co., who will dry dock the vessel at Levis and repair her.

Mrs. Andersen and her husband, Capt. Andersen, were also present, together with the wife of Chief Officer Tuftenes, while Captain Ove Lange watched the sale in the interests of the Norwegian underwriters.

The Storstad is now in dry dock at Levis, and when refitted will continue to ply in the coal trade between Sydney and Montreal.

The Terminal Facilities of North Pacific Ports is the title of a volume which has just been issued by the Terminal Publishing Co., Seattle. It covers the principal ports from San Diego on the south to Nome on the north. The regulations governing these ports are given in full, and all charges that are assessed against either the ship or the cargo are included. The names and addresses of government officials, foreign consuls and others in each port, whose names and addresses are of value to masters and shippers, are given. One section is devoted to the depth of water in all the bays and inlets on the United States coast. The customs, marine insurance, immigration regulations and matters of that sort are set forth in detail. There are scores of tables in the work. The money of all foreign countries is reduced to its Canadian and United States equivalent and foreign weights are reduced to avoirdupois pounds. One remarkably useful table which is included, and which is here published for the first time, gives at a glance the amount of freight due on any shipment that is paid by its cubic measurement. With this book at his elbow a transportation man need not waste time in figuring out rates. To find the cost of 17 cubic feet at $23 per ton entails no more labor than running a pencil along a line and copying down the figures. The arrangement of the index is in itself a refreshing departure. As soon as we open the front cover we find the index, being the first thing offered in the book. Typographically the work is easy to read, and is well and substantially bound in cloth. It should find a ready place in all marine libraries

Insurance & Professional DIRECTORY

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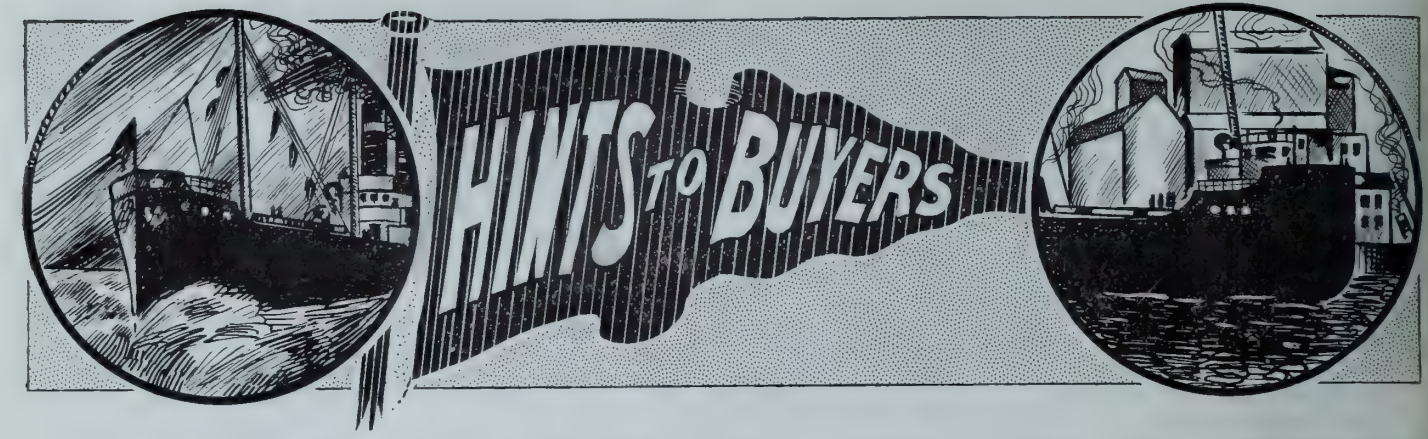

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National Transcontinental Railway Car Ferry "Leonard"

By C.T.R.

This vessel, unique in many particulars in her constructional features, recently arrived at Quebec after a successful voyage across the Atlantic. Her special purpose is to connect the St. Lawrence north and south shore traffic of the National Transcontinental Railway, pending the completion of what is known as the Quebec Bridge now being built across the river above Quebec City.

THE National Transcontinental Railroad car ferry **Leonard** arrived at Quebec on August 18, having successfully made the Atlantic voyage after completion of construction, and a series of satisfactory trials by her builders, Cammell, Laird & Co., Birkenhead, England. The owners were represented at the trials by Charles Duguid, chief constructor in the Department of Marine and Fisheries, Ottawa, and by J. E. Hamilton, resident surveyor. Exhaustive trials of the lifting gear were made.

She is designed for the special service of transporting standard railway trains of passenger or freight cars across the River St. Lawrence at all seasons of the year, between Quebec and Levis, the weight of train provided for being 1285 tons. It is expected that the time taken in running the train on to the ferry, traversing the river (a distance of 2½ miles), and landing and coupling up the train on the opposite side, will not occupy more than three-quarters of an hour. The principal dimensions are as follows:—

Length over all, 326 ft. 0 ins.
Breadth moulded, 65 ft. 0 ins.
Breadth over fenders, 66 ft., 9½ ins.
Depth moulded, 23 ft. 0 ins.
Mean draft, 15 ft. 0 ins.
Speed, 15 statute miles per hr.
I.H.P. of main engines, 3200.
I.H.P. of ice propeller, 420.

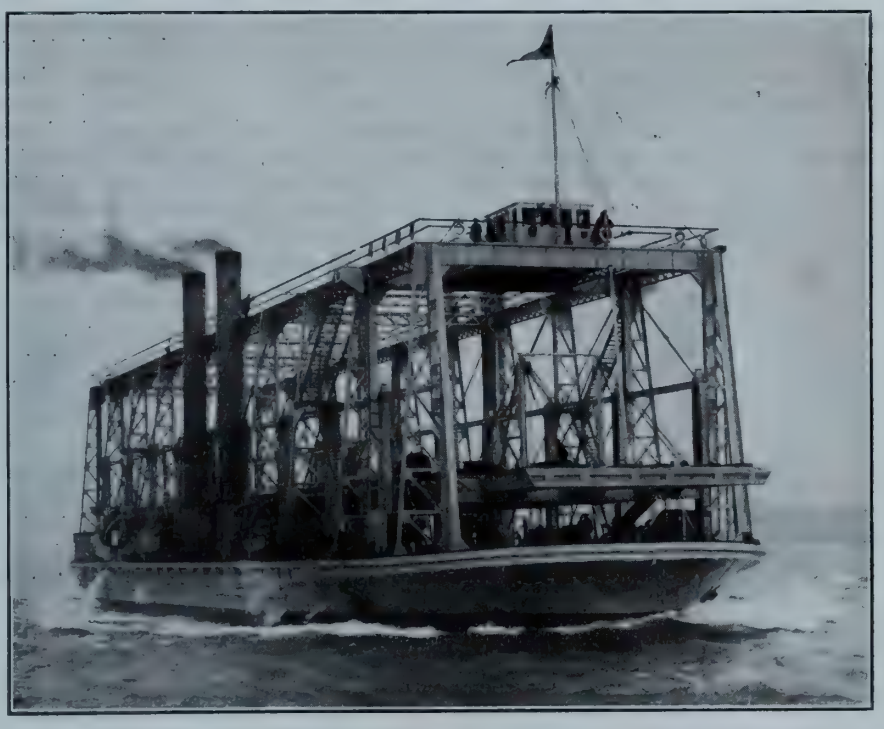
Vessel Description.

The vessel is of the twin screw type with a third ice breaking propeller at the forward end. She is designed in accordance with the requirements of Lloyd's Register, classed 100 A1, and is specially strengthened for ice. As a train ferry, she represents a new departure, several unique ideas being embodied. The special feature of the design is the moveable tidal car deck. The railway tracks on the landing berths at Quebec and Levis are built at a fixed level and the vessel is arranged with the tidal deck to take coaches and locomotive from the fixed track at any state of tide, the range being 18 ft. The tidal deck is arranged above the main deck of the vessel and has ten transverse girders each end of which rests on a large nut, which works up and down on a vertical screw, giving the deck the necessary range of action to suit the various conditions of tide.

Three lengths of track are fitted on the tidal deck, each supported on lattice girders. The length of each track is about 272 feet. At each end of the tidal deck an adjustable hinged gangway is suspended by means of treble purchases from struts fixed on the deck. These gangways are arranged with ball and socket joints at the ends of each of the girders carrying the rails, to allow for any heel of ship or change of trim which takes place while loading or unloading the ferry. A special motor is arranged in conjunction with each gangway for controlling same. The tidal deck lifting screws are hung from ball bearings supported on strong columns. These columns are stayed by lattice buttresses against fore and aft and transverse thrusts, while below the main deck a specially strong braced strut is built in way of each column, which distributes the load to the keel of the ship.

The main deck and hull are suitably strengthened by additional intercostals, etc., to ensure sufficient strength to resist the stresses induced by the heavy loads on the tidal deck. The braced columns below the main deck also serve to carry the worm gearing for lifting the tidal deck. Above the highest position of carriages on the tidal deck a promenade is arranged all round the vessel with a bridge platform at the forward end carrying a pilot house and chart room. The promenade and bridge are carried on lattice girders supported by the buttresses. Special arrangements are made to prevent any stress which would result from the bending moment on the hull being taken by the girders supporting the promenade.

The boiler rooms are arranged in wing compartments amidships with coal bunkers and tidal deck engine room between them. The main propelling engines are situated abaft the boiler rooms, and the engines for the ice propeller are placed in the hold just abaft the fore peak bulkhead. A special feed water tank is built in the double bottom extending from bilge to bilge for a length of three frame spaces, and ample local stiffening is arranged to allow of the bottom being perforated to assure a sufficient supply of water when working in ice. The pumping and heating arrangements



NATIONAL TRANSCONTINENTAL RAILWAY CAR FERRY "LEONARD"

are exceptionally complete, special provision being made for heating the carriages during transit. Accommodation is arranged for officers and crew on a flat below the main deck forward on both sides of the ship, and everything necessary for full day and night crews is furnished.

The vessel is equipped with electric light throughout and an electric winch with two winding drums is fitted between girders of the tidal deck for hauling the carriages on or off the ship. Two powerful steam windlasses are fitted, one on each side of the vessel with slip drums for mooring.

Description of Machinery.

The propelling machinery consists of two sets of triple expansion surface condensing engines, with cylinders 23 ins., 35 ins. and 55 ins. diameter by 33 ins. stroke, designed to run at 120 revolutions per minute. A special feature of the machinery is the shafting, which is made throughout much stronger than usual to withstand **shock** should the propellers strike solid ice during the winter months. The propellers themselves have also been made specially strong for this reason, and are made of nickel steel. Steam is supplied by eight single-ended boilers working under natural draught and constructed for a working pressure of 165 lbs. per square inch. The boiler rooms are arranged on the port and starboard sides of the vessel with bunker in centre. At the forward end of the vessel a set of compound surface condensing engines are fitted, having cyinders 15 ins. and 32 ins. diameter by 21 ins. stroke, for driving a nickel steel propeller whose purpose is to clear ice from landing stage. This propeller is arranged to run idly during the summer months.

The machinery for raising and lowering the train deck is of special construction throughout. The engine is of the four cylinder high pressure type of massive design, driving through double helical spur wheels, a second motion shaft running athwart ship. At each end of this shaft, mitre wheels are arranged for driving the fore and aft line shafting arranged on both port and starboard sides of the vessel. At equal distances along the shafting, worm and wheel gearing is fitted for turning the lifting screws; the latter being driven through a loose forged steel sleeve and sliding key arrangement, fitted into the boss of the wheel. Heavy gunmetal nuts into which the screws work are fitted into the structure of the train deck, the load coming upon the screws being taken up by special ball bearings supported by the upper structure of the vessel. A complete installation of auxiliary machinery has been provided.

THE LAUNCHING OF A SHIP.

AT a meeting of the students' section of the Liverpool Engineering Society, E. W. Bell, of Cammel, Laird & Co., Birkenhead, read a paper on "Launching." The author, in the course of his paper, said the process of launching ranks among the greatest engineering feats of the time, and it is only because of the continually repeated successes of the present day that it is regarded with comparative indifference.

When one looks into the calculations which have to be executed to ensure a successful launch, one realizes that the whole thing is the outcome of long years of experience, and most of it dearly bought. The fact that the ship has to be launched must be borne in mind all through the building. First and foremost the ship must be built on a declivity ranging from about $\frac{5}{8}$ in. to $\frac{3}{4}$ in. per foot, and this in itself, makes the building much more difficult than in the case of a boat which is built for instance in a dry dock. Then again, everything which, on the finished ship is vertical in a longitudinal direction, must be erected at an angle to the vertical before launching. This is the cause of many mistakes on the part of workmen, and much delay and annoyance is brought about. We see thus that all through the building, from the time the keel is laid to the time the vessel is launched the fact that this must take place is the cause of much extra expense.

Preparing the Launching Ways.

When we come to the actual preparing of the slipways for a launch, we find that it is quite a long process. About three weeks or a month before the day of the launch the work of laying the ways is commenced. The first to go down are the standing ways, which are laid on blocks and packed up to the correct declivity, which is slightly more than the declivity of the building blocks, and in the case of a big ship is not constant, but gradually gets greater towards the river end, taking the form of a camber. The standing ways are laid on blocks of the same type as keel blocks, slightly more than one-third of the vessel's extreme breadth apart, and a little farther apart at the after end than at the forward end, this being to prevent any jamming as the forward end slides down. On the top of the standing ways is about $\frac{1}{2}$ inch of grease, which is generally a mixture of tallow and soft soap. Tallow is melted down, and poured on to the ways, where it sets. Soft soap is then put on the top of the tallow; this acts as a lubricant until the harder tallow is melted by the friction.

The sliding ways are composed of baulks of timber bolted together in lengths of about 20 feet. These are scarfed at the joints but not bolted, the only fastening being a stout chain secured to both logs by shackles, so that when the logs are afloat in the water, none will come adrift.

Releasing Arrangements.

The releasing arrangements of a launch are very variable. With light boats it is only necessary to use dog shores, but it is quite insufficient with ships of even moderate size; in the latter case, hydraulic triggers are fitted in both ways about midships. The trigger which pivots in the standing ways projects into the sliding ways, and as long as the pressure is kept on the lower end of the trigger by means of a powerful hydraulic ram, the boat cannot go, but as soon as the pressure is released the trigger will pivot clear as the sliding ways pass down. When released, the boat and cradle move very slowly at first, but rapidly gain speed until they are in the water, but before this, there is a very critical point to pass, viz., when the stern end is water borne. Another important point, is that the tide should be at the height assumed for the calculations. It was not until 1883, when the Daphne caphized in launching, that the necessity of calculating the stability of a ship in launching condition was brought forcibly to notice. The condition is a very low C.B., a high C.G., and great freeboard. The tendency is, therefore, towards having a very small G.M., which is shown to be undesirable. The proposition is that the weight must be so distributed as to bring the C.G. as low as possible.

Launch Observations.

As the boat is launching certain observations have to be taken for data for future launches, the most important of these being acceleration of travel and velocity. To know this is very important. There are many ways of measuring the acceleration of a boat. One is by means of a cord attached to the stem of the vessel. As the boat slides down, the cord causes a disc to revolve. The diameter of same is known, and so the distance the cord has traveled can be readily seen by counting the number of revolutions made by the disc. On this disc is a strip of paper, and working on the paper is a pencil actuated by clockwork to oscillate in a known time, and by measuring from crest to crest of the wavy line so drawn, one can ascertain the acceleration. It is found, however, that the sag in the cord makes a difference to the reading.

A method much practised is to have four or five men with stop watches stationed at known intervals down the slipway. When the boat is perceived to be started, each man starts his watch, and as the bow passes him, he stops it; the last man stopping his watch as the bow drops clear of the ways.

Recent Notable Developments in Marine Propulsion*

By Professor W. H. Watkinson

In no section of the enormous field comprehended by the word engineering and the department more specifically related to motive power, is there apparent the like enterprise and corresponding achievement to that which is being applied to and accomplished in the realm of marine propulsion through a varied type accessory equipment.

DURING the one hundred years that the reciprocating engine has been used for the propulsion of ships, it has been continuously improved in reliability, handiness, and efficiency, and it had no competitor until a little more than a dozen years ago, when the Parsons turbine began to claim attention as a serious rival.

The improvements in the efficiency of the reciprocating steam engine have been due to the conjoint effects of improved materials and tools for the construction of the boilers and the engines and to increasing knowledge of the scientific principles relating to the thermal and mechanical problems involved in the design and construction of the engine and its auxiliaries. The introduction of the compound, triple, and quadruple-expansion engines, associated in each case with considerable increases in steam pressure, enabled successive and notable increases to be obtained both in the thermal and mechanical efficiencies of the engine, and the successful re-introduction of superheating has rendered it possible still further to reduce the consumption of coal per horse-power hour by from 10 to 20 per cent. under favourable conditions.

Balanced Reciprocating Engines.

In all reciprocating engines, the piston and other reciprocating parts have to be stopped and started again twice for each revolution of the crank shaft, and the forces transmitted to the bedplate of the engine, due to the starting and stopping of the reciprocating masses, are so great that unless balanced they cause great vibration of both the engine and of the ship. Even when the forces are balanced within the engine framing, some parts of the framing have to transmit these great forces, and these parts have, in consequence, to be made stronger and heavier than they would require to be if there were no forces due to the inertia of the reciprocating masses. Increased knowledge has rendered it possible entirely to balance these inertia forces and couples within the engine framing itself, but for a complete balance the minimum number of cranks required is five, although it is possible to get an approximate balance in an engine with four cranks.

*From a lecture delivered at the Liverpool University.

Direct Connected Steam Turbine.

In order to get rid of some of the mechanical defects of the reciprocating engine, James Watt and innumerable inventors since his time have striven to produce a successful type of rotary steam engine, but all these efforts were in vain until Parsons solved the problem by inventing his compound steam turbine. This type of engine consists essentially of one moving part only, the turbine drum, which has only rotational motion, and which therefore can be perfectly balanced. The success of the steam turbine for marine propulsion has been due, not to the reduction of steam and coal consumption, but to the absence of vibration in its working, to the reduction in weight and in space occupied for a given power, to its greater simplicity as a machine, to the lower cost of maintenance, and to the great units of power in which it can be constructed. When the turbine can be arranged to run at its best speed, its efficiency is at least equal to, and in many cases greater than, the efficiency of the best reciprocating steam engine, but this speed is much greater than the best speed for a screw propeller.

In applying a steam turbine for marine propulsion it was necessary to effect a compromise. The turbines were designed to run at a much lower speed than turbines of the same power used for the driving of dynamos, and the screw propellers were made of smaller diameter and their speed of rotation was increased as compared with propellers driven by reciprocating engines. These modifications involved larger turbines, with more expansion stages, also a reduction in the efficiences of the turbine and of the propeller. In spite of these difficulties, the direct connected turbine proved itself to be much superior to the reciprocating steam engine for high-powered ships.

Geared Steam Turbine.

Owing to the difficulties which I have indicated, the field of application of the direct-coupled steam turbine has been restricted to high-speed high-powered ships. In order to render the many advantages of the steam turbine available for small-powered lower-speed ships, Sir Charles Parsons has introduced helical gearing for connecting high-speed turbines to low-speed propeller shafts, and the results of experience already obtained with these geared turbines are so promising as to render it likely that this system will be largely adopted in the immediate future. The gear ratio varies with the conditions. In the case of the Vespasian this ratio is 20, the turbine running at 1440 revolutions per minute, and the propeller shaft at 72 revolutions per minute. The shaft horse-power at 73 revolutions per minute was 1080, and the corresponding speed of the ship was 10.58 knots.

In the case of the twin-screw channel steamers Normania and Hantonia, each of which is fitted with geared turbines giving 5,000 shaft horse-power at 19.7 knots, there are four turbines, two of which run at 2000 revolutions and the other two at 1400 revolutions, while the propeller shafts both run at 310 revolutions. The results of measurements show that the geared turbined ship Cairnross used 15 per cent. less coal than her sister ship the Cairngowan, which is fitted with triple-expansion engines. The efficiency of Parsons helical gearing is stated to be 98½ per cent., so that the friction loss due to its use is only 1½ per cent., whereas the gain at the turbine is many times this. The high efficiency of the gearing is due to the accuracy with which the teeth are formed, also the effective means adopted for lubricating the teeth. A spray of oil is continually showered upon the teeth as they enter into mesh with one another, and the resulting films of oil prevent the teeth coming into contact with each other, and the conditions are therefore the same as in a well-lubricated bearing.

In a few ships a steam turbine has been coupled up in a series with quadruple-expansion engines, thus enabling the expansion to be carried further than can be effected in a reciprocating engine, and it is said that this combination has effected a reduction of 20 per cent. in steam consumption as compared with the quadruple-expansion engine alone. The complexity of this combination and the successful introduction of the geared turbine will, I think, prevent it being widely adopted.

Hydraulic Transmission.

Another method which is being developed as a reducing gear between steam turbines and propeller shaft is the Fottinger hydraulic transmitter. This con-

sists essentially of a centrifugal pump and a water turbine combined within the same casing in such a way as to reduce the losses to a minimum. The efficiency of this type of reducing gear is not so high as that of the Parsons gear, but it is stated that in the case of large powers the efficiency may be as high as 90 per cent. This gear has the advantage that it is reversible, and, therefore, it obviates the need for the go-astern steam turbines and the direction of rotation of the driving steam turbine is never reversed. It thus gets rid of one cause of blade stripping such as occurred, for instance, in the turbines of the Lusitania. It also enables the power for going astern to be as much as 80 per cent. of the go-ahead power, which is very much greater than that usually provided in the go-astern turbines. The maximum power transmitted to one shaft by this gear up to the present is 10,200 horse-power, and the reversal can be effected in from 10 to 12 seconds. This gear is being applied on a German turbine ship of 23,000 horse-power, and the efficiency guaranteed is 90 per cent., but a better result than this is expected. This gear is used on the Holtzapfel gas-propelled vessel, also in connection with Diesel engines. The velocity ratio possible with this gear is only about 6 to 1 with a single-stage arrangement, but with a three-stage combination it may be as high as 30 to 1.

The Boiler Feature.

No notable improvements have been made in recent years in the design or in the efficiency of marine boilers, excepting in the case of those used in warships, which are now always of the water-tube type. This type of boiler has not found favor in the ships of the mercantile marine, mainly because it requires more skilled and more careful attention than the ordinary type of marine boiler and because it is of greater importance to prevent oil and sea-water being admitted. Improvements in condensers and the adoption of the steam turbine reduce these difficulties, and it is likely that for high-powered ships the water-tube boiler will in the near future displace the ordinary type of boiler, because its weight and the space occupied are considerably reduced by its adoption.

Recently a new type of boiler has been introduced by Professor Bone which enables great reductions to be made in the size, weight and cost of boilers. This boiler is of the ordinary multi-tubular type, but it contains neither furnaces nor combustion chambers of the usual type. The tubes are packed with a refractory material and the fuel, gas, or oil spray is burned within the tubes of the boiler. The refractory material greatly increases the rate of combustion and also greatly increases the rate of evaporation. In one boiler the rate of evaporation was over 20 lb. per square foot of tube surface per hour, which is from three to four times as great as that usually attained in marine boilers, and it is stated that the efficiency was over 90 per cent., as compared with from 70 to 80 per cent. in boilers of the ordinary type. The boiler cannot, unfortunately, be fired with coal direct. The coal must first be gasified and the gas must be thoroughly cleansed of ash and tar. This boiler, therefore, would be of no use for marine purposes were it not for the fact that fuel oil when suitably sprayed may be used in conjunction with it. If the results already obtained with this type of boiler are proved to be attainable under regular working conditions at sea with oil fuel, it is probable that it may displace the water-tube boiler for warships.

Propelling Machinery Comparisons.

The following comparisons between quadruple-expansion reciprocating engines, ordinary turbines, and geared turbines may be of interest:—

Propelling Machinery Comparisons.

	Vessel 480 ft. long, trial speed 14¼ knots.		Vessel 600 ft. long, trial speed 19½ knots.	
	Quadruple reciprocating	Geared turbines	Ordinary turbines	Geared turbines
Total weight of machinery in tons	1345	1050	3060	2910
Weight of coal per hour, tons	4.8	4.1	13.6	12.5
Area of engine-room	1950	1950	5020	3990
Area of boiler-rooms, without bunkers	2110	2020	6400	6160

Internal Combustion Engines.

The steam engine, whether of the reciprocating or of the turbine type, has, however, a much lower possible efficiency than the internal combustion engine. If coal is burned without excess of air, the temperature attainable is about 5200 deg. Fah., and a perfect engine working between this temperature limit and the temperature of the atmosphere would convert 91 per cent. of the heat into work. With a perfect boiler the weight of coal required per indicated horse-power hour would be only one-fifth of a pound, and the weight of oil required would be only .133 of a pound.

The maximum temperature attained in the cylinders of gas and oil engines is about 3000 deg. Fah. and a perfect cycle would convert 85 per cent. of the heat into work, and would be only .159 lb. of oil per indicated horse-power hour. The thermal efficiency actually attained in Diesel engines is about 42 per cent., and the weight of oil per indicated horse-power hour is about one-third of a pound, and the weight of oil per brake horse-power hour is about .4 lb.

The great handicap of the steam engine is the big drop in temperature between the furnace and the steam. The best result yet attained with a steam engine and boiler is a combined efficiency of 17 per cent., and, including engine friction, 15 per cent. It is usually very considerably less than this. With the above efficiency the weight of coal used per indicated horse-power is equal to 1.08 lb. per hour, and the weight of coal per brake horse-power hour works out at 1.22 lb. The greater possibilities of the internal combustion engine as compared with the steam engine and the results already achieved with marine Diesel engines must compel increasing attention to be given to this development.

Oil Fuel at Sea.

With internal combustion engines the fuel may be either coal or oil, but at present there is no gas producer available suitable for marine purposes, and very few men appear to be devoting themselves to the solution of this important problem. The line of least resistance for marine work is the use of oil fuel, as this does not involve the use of gas producers and their accessories. The fact, established by actual experience at sea, that the weight of oil required per brake horse-power hour by Diesel engines is only from one-quarter to one-fifth the weight of coal required with steam engines, whether of the reciprocating or of the turbine type, enables oil fuel to be used with commercial success even when the price of oil is six or seven times the price of coal, because of the other savings and advantages obtained with these engines.

Until recently the only fuel used on board ship, with very few exceptions, has been coal, but within the last few years oil fuel has been gradually introduced for generating steam in warships. For marine purposes in general oil fuel has many and great advantages over coal. Its heat value per pound is 50 per cent. greater than that of good coal, so that even with steamships only two-thirds the weight of fuel is required. It can be stored in the double bottom and in other remote parts of the ship. It is self-trimming. It can be put on board in much less time and with entire absence of dirt and dust. Stokers and trimmers are not wanted. It is not liable to spontaneous combustion, and there are no ashes to be got rid of.

The sources at present available for oil for Diesel engines are:

(1)—From crude oil obtained from wells.

(2)—Shale oil, as obtained in Scotland.

(3)—Tar oil.

The present output of crude oil from wells is about 50 million tons per annum, but the whole of this is not, of course, available for Diesel engines. The crude oil is distilled, and petrol, lamp oil, and lubricating oils are obtained from it. The residue is the kind of oil used for Diesel engines.

It has been estimated that if all the power propelled ships in existence were driven by Diesel engines of the present realized efficiency the amount of fuel required per annum would be about 25 million tons. In Germany, owing to a heavy import duty on oil, a great deal of attention has been devoted to the manufacture of oil from coal tar, and practically all the heavy oil engines in Germany are run on tar oil, of which the output during this year will probably amount to about one million tons. This is probably about five times as much as would be required for all the ships of her navy if these were propelled by Diesel engines, and as a Diesel engine ship can carry sufficient oil to enable her to go to any part of the world, fight her battles, and return home without taking in any fresh supplies, the relative advantages which we at present possess, due to our coaling stations, would vanish if she were to adopt Diesel engines for the propulsion of her ships of war. Possibly the realization of this great increase of her power has had something to do with the enormous expenditure of energy and money on researches and other experimental work in connection with Diesel engines in Germany.

The Coal Feature.

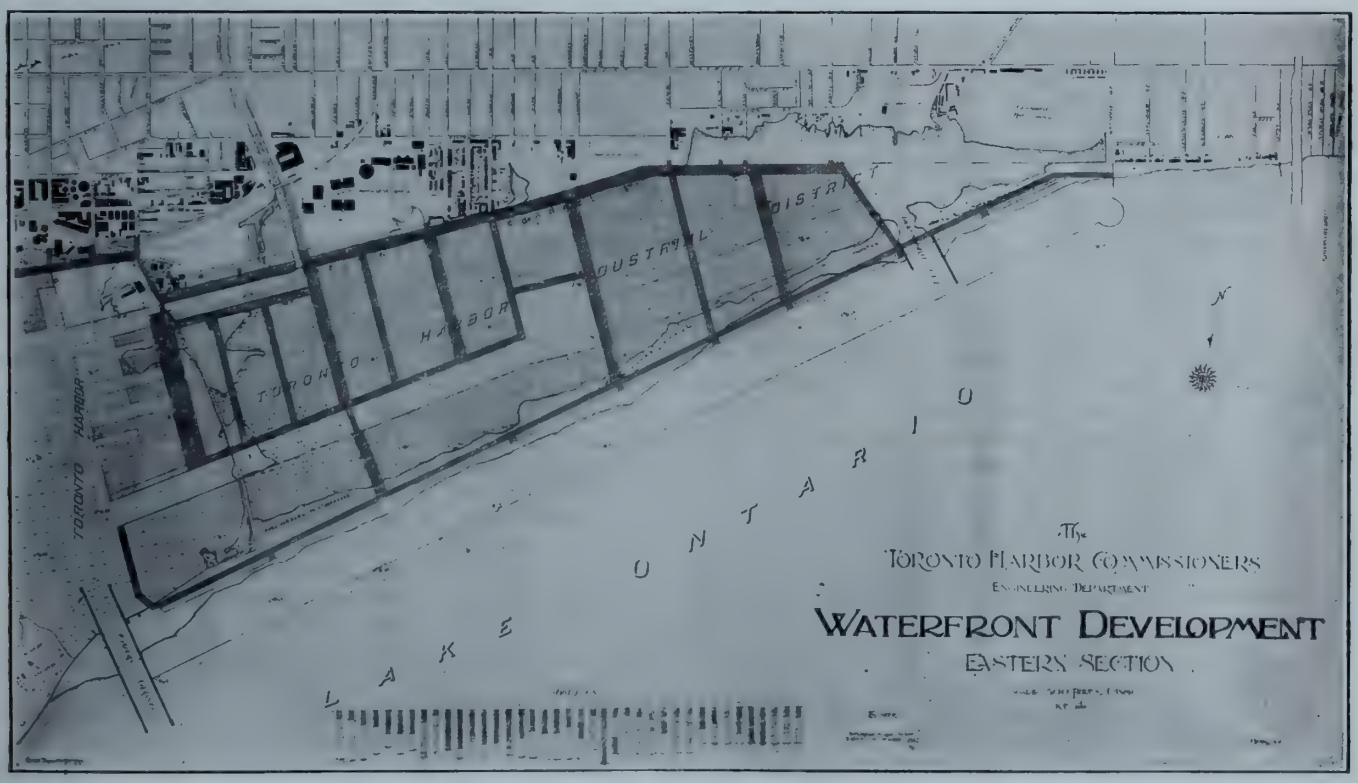
We, unfortunately, have no natural supply of oil, and if we are to continue to use coal for marine propulsion, we must devote ourselves to the evolution of a suitable gas producer. Coal, however, is not a source of heat energy only, but it can be made the source of valuable and tar. The amount of tar at present produced in Great Britain is sufficient for marine purposes, but we may soon find it more profitable to convert coal into coke or coalite and gas, than to burn raw coal for domestic and power purposes.

The total output of coal from British mines in the year 1910 was 264,433,000 tons, and the total amount of coal exported during that year was 62,085,500 tons, while the amount used for various purposes in the country and on British ships amounted to over 202,000,000 tons. If the whole of this 202,000,000 tons of coal, instead of being burned in the raw state, had been converted into coke or coalite, it would have been possible to obtain from it about 20,000,000 tons of tar, and from this tar about 8,000,000 tons of tar oil suitable for use in Diesel engines could have been obtained. This weight of oil would, if burned in Diesel engines, be equivalent to at least four times this weight of coal burned in steam boilers, that is, it would give at least the amount of power obtainable from 32,000,000 tons of coal.

The weight of coal used in British steamers engaged in foreign trade during 1910 was 19,500,000 tons, and the amount required for warships was about 2,000,000 tons. It is therefore evident that we might in this way obtain more than all the oil required for the propulsion of all our ships, both of the Navy and mercantile marine.

HARBOR DEVELOPMENT AT TORONTO, ONT.

THE phenomenal growth of Toronto, as a manufacturing center, up to the present time, has been of a haphazard nature and absolutely without aid from the civic or other public bodies who in other cities spend so much time and effort to secure new industries. The opening of the year 1914, however, witnessed the commencement of a work which marks a new era in Toronto's industrial history, and with which the people of the whole North American continent are by this time thoroughly familiar; to wit, the gigantic plans of the Toronto Harbor Commissioners for the development of the city's harbor and waterfront. The section of this development regarded by the commissioners as its most important work is the reclamation of the Ashbridge's Bay district for the purpose of providing an ideal location for industries of every description. From now on industries seeking a location in Canada will be taken in hand by the Harbor Commissioners of Toronto, and will be shown factory sites in an industrial dis-



HARBOR DEVELOPMENT AT TORONTO, ONT.

trict within a mile of the heart of a big city and served by railway sidings connecting with all three Canadian Transcontinental Railroads in addition to service at public docks by lines of freight vessels carrying cargoes from Montreal in the East to the head of navigation at Fort William in the West.

Transportation Facilities.

The Harbor Commissioners have provided for an expenditure of $15,000,000 to place this industrial district in condition for use and when their work is completed they will have created 646 acres of land available for industries on which it is estimated 1,000 new factories can be located. These factory sites have been laid out on the lines of most modern developments, railroad siding reservations totaling thirty miles in length having been set aside by the commissioners for the purpose of serving the district and each individual lot. These sidings will be at the service of factories locating on the property of the commissioners and will be free of expense to them. Thirty miles of streets varying in width from a minimum of 75 feet to a maximum of 175 feet will be provided for pedestrian, vehicular and street railway use and five miles of docks will be constructed to serve the shipping needs of the district.

In planning for railroad service in the Toronto harbor industrial district under which name Ashbridge's Bay will be known in future, the commissioners have made a traffic agreement with the three railroads under which there will be no interswitching charges, the result being that factories locating on the lands of the commissioners will receive or ship goods over any one of the three lines without being subject to the vexatious charge of from $5 to $8 per car which is inflicted on factories located on only one line of railway.

Reclamation Work.

The reclamation work as outlined above is already well under way, substantial progress having been made during the present summer on contracts which amount in total to over eleven million dollars. Over 100 acres of land have already been reclaimed, one large modern dock served by 24 feet of water has just been completed, and work is rapidly progressing on the first section of a ship channel, 400 feet wide by 7,800 feet long, which will provide access for large vessels right into the heart of the district. The dredging and pile-driving plants of three companies, in addition to the fine modern plant owned by the commissioners themselves, have been busy at work since June carrying out the plans prepared by the commissioners, and approved by the City Council and Dominion Government.

HIGH-PRESSURE MARINE BOILER ECONOMY.

IT is absolutely essential for boiler economy, says the Journal of Commerce, that the coal used be of the best quality, this consideration being an important factor in obtaining the maximum horsepower from the steam generators. Especially does this apply when high power water-tube boilers are installed. Bad coal causes large deposits of soot, etc., to collect on the fire side of the tubes, thus not only stopping the conduction of the furnace heat, but causing the tubes to require constant cleaning. This in itself is a big loss of economy. It must also be borne in mind that deposits are also found on the baffles and uptakes.

Various devices are adopted for cleaning such deposits, but with a good coal these deposits are to a great extent eliminated, such as are found being easily removable. Patent fuel is not recommended, such fuel forming very bad deposits on the tubes, etc., and being hard to remove materially increases the fuel consumption. In addition to this, the removal of such deposits in small water-tube boilers, where the tube spacing is very close, is not the easiest of operations, and there is a great tendency to injure the tubes.

Furnace Losses and Their Correction.

An analysis of the flue gas must be obtained in order to ascertain the proportion of carbon dioxide, carbon monoxide, and oxygen. In flue gas we find the above, and, upon their proportions, the efficiency of combustion is obtained. There should be no carbon monoxide and very little oxygen. If there is much oxygen, it shows that air is passing through the system, and thus decreasing its efficiency. Losses that take place in the furnace and reduction of same are:

1.—Waste by radiation and conduction. This is a big factor, and is remedied by efficiently lagging the steam pipes, boilers, etc. Asbestos in the form of millboard or asbestos fibre is a good lagging material, as is also a magnesia covering. Such lagging may be secured by light steel plates or asbestos cloth stitched in position.

2.—Waste by hot gases leaving the funnel, and thus doing no useful work. This may be obviated to a great extent by using these hot gases to heat the feed water or steam, as in the case of economisers and superheaters. A method sometimes adopted is the utilization of the heat in the gases in heating the air supply to the furnaces, this method preventing the cold air entering and striking the hot tubes, with consequent danger of leak at tube joints and junctions.

3.—Excessive smoke. This means that fuel is wasted in a smoky state, and should be rectified by careful regulation of the furnace air supply.

4.—Unburnt coal leaving the funnel. This defect must be remedied by even and good firing.

5.—By imperfect combustion of carbon to carbon monoxide instead of to carbon dioxide.

The Stoking Feature.

Stoking is a most vital factor in the reduction of the coal expenditure. A most important point is to keep the fires at a uniform thickness, depending upon the type of boiler and air pressure employed. In tank boilers the fire should be from 9 to 12 in. thick, and in water-tube boilers, say with 1 in. air pressure, from 7 to 10 in. In ordinary steaming with water-tube boilers not under air pressure, 5 in. should suffice. With water-tube boilers it is more economical to force them to the limit by air pressure—that is, fewer boilers are employed, such as are being worked at their maximum power. The fires should present a white appearance on top, and no holes must be allowed. A good plan is to observe the water in the ashpans, and see that no shadows appear.

Furnaces must be fired up strictly in rotation, if possible by the aid of a stoking indicator, the air supply must be carefully regulated, and only one furnace should be fired up at a time. The pressure maintained must be only just above that required for the specified speed, as a large steam reserve is unnecessary and materially increases the consumption.

Water Waste.

With tank boilers the chief causes of water waste are leaky doors, glands, and mountings. In water-tube boilers the hand-hole doors give trouble, and should be carefully tightened up when raising steam. In the case of tank boilers, an automatic regulator should care for the feed and, when forcing a boiler, half a glass should be maintained; but it must be noted that with a water-tube boiler great care must be taken that the feed water does not get too low.

The higher the temperature of the feed-water the greater the economy in coal. All auxiliary engine drains should be led to the feed tanks and, should this not suffice to maintain the desired temperature, the main and auxiliary circulating inlets must be closed sufficiently to give the desired result. In any case a temperature of 120 degs. Fah. or above must be maintained if economy is desired.

It is interesting to note that, in vessels fitted with superheaters, a gain in economy of approximately 12 per cent. has resulted, and this method of increasing the economy is rapidly coming into favor.

PACIFIC COAST DEVELOPMENTS

Featuring the Record of Progress and Dealing With the Steps Being Taken to Stimulate and Enlarge the Already Established Shipping and Shipbuilding Enterprises

LINER FOR NORTH PACIFIC TRADE

MUCH interest is centered in the recent launch by R. & W. Hawthorn, Leslie & Co., of the new British steamship Glengyle, built to the order of the Glen Line, and intended for service under the Royal Mail Steam Packet Co.'s flag between European ports and the North Pacific Coast. The Glengyle is one of the big fleet of new steamships now under construction for the Royal Mail and its subsidiary lines. The new fleet conists of the Glengyle, the Gleniffer, which is a sister ship; the Brecknockshire, the Carmarthenshire and the Pembrokeshire. These vessels are of between 10,000 and 13,000 tons register, and when completed will be operated out of London to Victoria and other ports in conjunction with the liners Cardiganshire and Carnarvonshire, which have already visited this coast in the Royal Mail service. The principal dimensions of the Glengyle are: Length, 516 feet; beam, 62.4 feet; depth, 37.6 feet; and deadweight capacity, 13,400 tons.

Of Special Design.

The vessel has been specially designed to meet the trade for which she is intended. She has a long bridge, poop and forecastle, with seven large holds, the hatchways being constructed and the disposition of the pillars arranged so as to facilitate the shipment and carriage of bulky cargo. She is fitted with 24 powerful winches and 30 derricks capable of dealing with weights up to 50 tons. One of the holds and two of the 'tween decks are equipped for the handling of frozen or chilled cargo. Accommodation is provided in the staterooms amidships for first-class passengers, with a spacious and tastefully decorated saloon underneath.

Quarters for the captain are arranged in a large house on the boat deck; and those for the officers and engineers in deckhouses around the engine and boiler casings, while the bridge and poop decks are so constructed as to be readily adapted for the accommodation of a large number of third-class passengers. The crew is berthed in the forecastle. The vessel will be efficiently lighted throughout, powerful cluster and arc lamps being placed at each hatchway for working cargo at night. A wireless installation is being fitted by the Marconi Company.

Propelling Machinery.

The propelling machinery of the Glengyle consists of two sets of triple expansion engines, having cylinder diameters of 24 in., 40½ in., 68 in., by 48 in. stroke, steam being supplied by five single-ended boilers working at a pressure of 200 lbs., and capable of giving the vessel a sea speed of 12½ knots. Captain Webster, a well-known skipper in the Glen service, has been assigned to the command of the Glengyle.

EMPRESS OF JAPAN FOR SCOUT DUTY.

ACCORDING to telegraphic advices received from the C.P.R. offices, Montreal, the Transpacific steamship Empress of Japan, one of the regular C.P.R. liners has been placed under charter by the Imperial Government for naval service on the Chinese Coast. The telegram stated that the sailings of the Empress of Japan were canceled after August 6, and that she would be detained together with the Empress of Asia, at Hongkong where, it is understood, both vessels will be fitted with guns and utilized as auxiliary cruisers.

The Empress of Japan is commanded by Captain Dixon Hopcraft, R.N.R., and her officers are all Royal Naval Reserve men. The vessel is one of the older ships of the line, but despite the fact that she has been operating in the Transpacific service for over twenty years, she has plenty of speed, as before the advent of the larger Empresses, she held the record of 10 days 10 hours between Yokohama and Victoria. Gun mountings are always carried aboard these steamers, and the six-inch guns are stored ashore at Hong-kong.

The liner Empress of Russia, Captain Wellesley Davidson, R.N.R., now at Vancouver, has been ordered to clear on schedule for Hongkong, where she may be required for naval service. The charter of these steamers will completely disorganize the C.P.R. transpacific service.

G.T.P. BOATS TO LAY UP.

TEMPORARY abandonment of the Grand Trunk Pacific service between Victoria, Seattle, Vancouver and Prince Rupert, maintained by the fast steamers Prince Rupert and Prince George, is the first direct result of the European war as affecting the British Columbia coasting trade. Through Captain C. H. Nicholson, manager of G.T.P. coast steamships, C. F. Earle, city passenger agent, has been advised that all sailings of the Prince Rupert and Prince George have been cancelled indefinitely. The cancellation of G.T.P. Northern sailings, which is now effective, was ordered by the directors of the G.T.P. at a recent conference in London.

Smaller Boats Not Affected.

The cancellation order does not affect the sailings of the steamers Prince John and Prince Albert, which will continue to operate on schedule between Victoria, Vancouver and Northern British Columbia ports.

The northern port of Prince Rupert and other points on the Portland Canal will be badly hit by the withdrawal of the G.T.P. flyers. For several years past Prince Rupert has been given a thirty-hour service with Vancouver, and for three years the G.T.P. has maintained a semi-weekly service between Victoria and Prince Rupert during the summer months and a weekly service during winter. Travel increased to such an extent during the past year that the G.T.P. decided to operate the two steamers Prince Rupert and Prince George throughout the winter, with an auxiliary service by the steamers Prince John and Prince Albert.

NEW C.P.R. LINER "PRINCESS MARGARET."

AS stated briefly in our July issue, Wm. Denny, Bros., Dumbarton, Scotland, launched on June 24 the geared turbine steamer Princess Margaret, being the first of two similar vessels the firm are building for the C.P.R. Pacific Coast service. The principal dimensions, etc., are as follows: —

Length, 395 ft.; breadth moulded, 54 ft., and depth to promenade deck, 28 ft. 3 in. They have each 42 staterooms, and a vestibule which is paneled in white having softly tinted glass. The first-class smoke-room is in Old English style, the framing being in antique oak with white panels. At the forward end is an Old English fireplace with brickwork tiling. On the promenade deck there are 77 first-class state-rooms and eight special rooms en suite. These special staterooms are executed in different styles, such as Adams, Sheraton, Chippendale, etc. At the forward end is the observation room, which is a feature in the company's Pacific Coast steamers.

The upper deck is devoted to passenger accommodation, and includes a ladies' lounge in Georgian style. The tea-room and the writing-room are framed in mahogany and have French windows opening into the vestibules. The

main deck aft is fitted up as a dining saloon for first-class passengers, and has accommodation for 160 persons. The dining saloon is in the Georgian style, framed in mahogany, painted white, and relieved with delicate tints, the furniture being of polished mahogany. The refrigerating equipment includes a CO_2 machine by J. & E. Hall, Ltd., Dartford. The vessel will be propelled by geared turbines, supplied with steam by oil-fired water-tube boilers, the installation being by Denny & Co.

Mr. James Denny, who presided at the luncheon after the launch, said the new vessel would have a speed of from 22 to 23 knots. Her construction was somewhat different from that to which they had been accustomed on his side of the Atlantic, he said, but she was adapted to the climate in which she was to serve. Twenty-six years ago his firm built the Princess Henriette, which was fitted with paddle engines, and the vessel just launched would develop per ton of machinery 33 per cent. more horse-power, and 50 per cent. more horse-power per ton of fuel used. That was a very notable advance on the part of those engaged in the industry of marine engineering.

PANAMA CANAL OPEN FOR TRAFFIC.

AFTER eleven years of sustained effort in face of almost insuperable difficulties, the formal opening of the Panama Canal, which recently took place, marks the accomplishment of a task of which every citizen of the United States may be justifiably proud. It has been well described as one of the wonders of the world.

Only those who have closely followed the gigantic engineering operations undertaken by the American nation can have any adequate conception of the problems involved, the difficulties surmounted and the victory which man has won over the forces of Nature. The junction of the waters of the Atlantic and Pacific is of enormous advantage not only to the nation which has sunk its money in the undertaking, but also to Canada and to the trading nations of the world.

In the midst of war it is well to remember the triumph of peace, and this canal, brought to successful completion through the indomitable pluck of the American people, is an evidence to the world that the victories of peace are not to be despised. Four centuries ago Columbus sought for a passage to the Indies through the narrow isthmus, and to-day a ship will pass from ocean to ocean, the forerunner of rich argosies from the ends of the earth.

In congratulating the American people on the vitality, boundless resource, and force of character that have combined to make this waterway possible, it is not forgotten that the formal opening to-day is of striking significance by reason of the fact that the pledges of the United States in regard to the canal tolls have been honorably carried out.

CONNAUGHT SEAMEN'S INSTITUTE.

AT a recent meeting of the executive committee of the Victoria Connaught Seamen's Institute the tender of Knott & Jones, local contractors, for the erection of the new Institute building was accepted, it being the lowest of the sixteen submitted. The meeting was attended by F. A. McDiarmid (chairman), Mrs. Troup, Mrs. Nerotsos and H. B. Thomson, M.P.P.; C. H. Lugrin, Herrick McGregor, Hebden Gillespie, W. A. Gleason, H. Morden, J. C. M. Keith (the architect), the Rev. H. A. Collison, Captain Troup and C. Wright Hill, the secretary. The building committee was authorized to vary the specifications in respect of the material to be used in the exterior of the building, with the provision that any additional cost shall not exceed $250. A stipulation is also to be inserted in the contract for the completion of the building within about two months.

The foundations of this new home for the Institute are already in place on the site at the corner of Kingston, Superior and Lawrence Streets, where the ceremony of laying the foundation stone was performed by H. R. H. the Duke of Connaught on the occasion of his visit last summer. The committee has now the necessary funds in hand, which include a subscription of $1,000 from the late Lord Strathcona and $2,500 from the Provincial Government, the remainder being made up by private subscription.

Syren and Shipping Annual "Empire Number," 236 pages, profusely illustrated, recently issued, contains, in addition to the usual review of current topics relative to ship owning, shipbuilding and marine engineering, a series of special articles, among which may be noted a comprehensive description of the Cunard liner Aquitania (so appropriately named the Ship Beautiful); the various enterprises of the Canadian Pacific Railway; Ocean Routes and Examples of Ships That Ply Them to Britain's Overseas Dominions. The port of Calcutta, British India, is described in such manner as to furnish much interesting data concerning its shipping facilities and traffic, while the oil resources of the Empire, the subject of another special article, cannot fail to interest those having to do with both the questions of oil fuel and of oil engine propulsion.

THE WORLD'S SHIPPING.

ON all the oceans and inland waters of the watery globe, there are 30,059 vessels, both steam and sail, of 100 tons and upwards, according to the Repertoire General of the Bureau Veritas for 1913-'14. Of these vessels 17,135 have propelling machinery and are classified as steamers, and the remaining 12,924 are sailing vessels. This shows to be erroneous the common belief that the use of sails as a motive power for vessels is almost obsolete. The United Kingdom easily leads all nations both in the number and tonnage of its merchant marine.

Under the British flag are 11,539 vessels. In the United States merchant marine there are 4,096 vessels. In tonnage of sailing vessels of fifty tons and upwards, the United States leads the world with 1,214.974 tons. Great Britain is second with 935,467 tons of sailing craft of fifty tons and over. These figures indicate that the epitaph of the canvas-winged ship is not written yet. Those who talk about the vanishing sailing ship are evidently not well informed.

While there is no definite information available showing the total number of motor vessels in the world, the total number is certainly enormous. The only available figures are those of the United States Commission of Navigation, which shows that in the United States alone there are over 300.000 power vessels, a large percentage of which are used for freight work, fishing and commercial passenger transportation. These figures show that in the United States there are seventy-seven times as many motor vessels as there are in the combined fleets, of both steam and sailing merchant marine of the wholde world.

In motor vessels used for both pleasure and commerce the British Empire would probably make a greater showing in both numbers and tonnage than the United States. The average tonnage of a forty-foot boat is five tons, so that it is clear that the tonnage of the world's motor craft would be very great, and would approach that of the steam and sailing vessels.

This enormous fleet of power boats, large and small, has accumulated within a few years. Before the gasoline and oil fuel engines came into use, there were of course no motor boats, except a small number of launches driven by electric motors. At that not remote time steam was practically the only marine motive power. Now there are many motor vessels each of several thousand tons register, and those of fifty tons and over driven by motor engines are very numerous.

GREAT LAKES AND ST. LAWRENCE

Water Transportation From the Atlantic to the Heart of Canada is one of the Live Issues of our Time and is Daily Becoming of Increased Importance

PORT REGULATIONS IN FORCE AT MONTREAL.

THE attention of mariners is called to the Canadian regulations affecting the closing of ports which are now in force. If entrance to a port is prohibited, three red vertical lights by night and three red vertical balls by day, will be exhibited in some conspicuous position, in or near to its approach, which signals will also be shown by the vessels detailed to examine incoming ships. If these signals are displayed, vessels must either proceed to the position marked **Examination Anchorage** on the Admiralty charts and anchor there, or keep the sea.

At the ports of Halifax, Quebec and Esquimalt, B.C., searchlights are occasionally exhibited. Instructions have been given to avoid directing movable searchlights, but mariners are warned that great care should be taken to keep a sharp look-out for the signals indicated above, when searchlights are observed to be working. Vessels carrying distinguishing flags or lights will be charged with the duty of examining ships which desire to enter the ports and of alloting positions in which they shall anchor. As the institution of the examination service at any port will not be publicly advertised, especial care should be taken in approaching the ports, by day or night, to keep a sharp look-out for any vessel carrying the special flags or lights, and to be ready to **bring to** at once when hailed by her or warned by the firing of a gun or sound rocket.

By day the distinguishing flags of the examination steamer will be a special flag (white and red horizontal surrounded by a blue border) and a blue ensign; also, three red vertical balls if the port is closed.

By night the steamer will carry:—(a) Three red vertical lights if the port is closed, and (b) three white vertical lights if the port is open. The above lights will be carried in addition to the ordinary navigation lights, and will show an unbroken light around the horizon.

Masters are warned that, before attempting to enter any of these ports where the examination service is in force, they must in their own interests strictly obey all instructions as to entry given to them by the examination steamer. In the absence of any instructions from the examination steamer they must proceed to the position marked **Examination Anchorage** on the Admiralty charts and anchor there, or keep the sea.

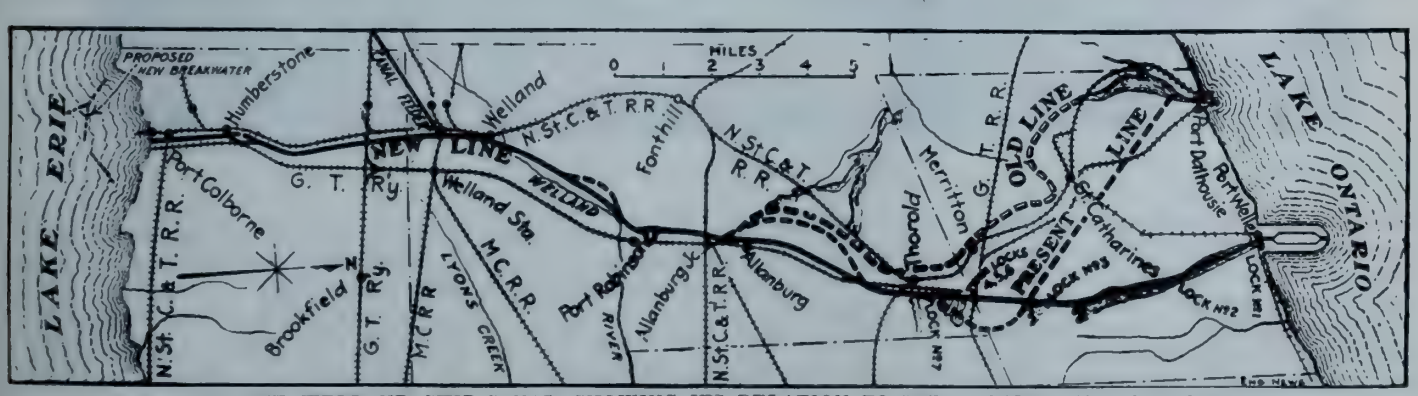
In case of fog, masters of vessels are enjoined to use the utmost care, and the **Examination Anchorage** itself should be approached with caution. The pilots attached to the various ports are acquainted with the regulations to be followed.

JAMES SMITH LEAVES COLLINGWOOD SHIPBUILDING CO.

GENERAL regret was expressed when, a short time ago, it was learned that James M. Smith, manager of the Collingwood Shipbuilding Co., had severed his connection with that firm. He has been in Collingwood a number of years and has proven himself a booster for the old town, having always put his full energy into anything and everything that tended to shove Collingwood to the front, and, should the change in his relations with the Shipbuilding Co. necessitate his removal, the town will suffer a distinct loss that it can ill afford. As yet, however, he has not decided as to this.

Not only with the citizens generally is Mr. Smith popular, but with the employees of the shipyard, which in itself is a high testimonial, demonstrating as it does the good-will that existed be-

WATER FRONT, SARNIA, ONT.



THE NEW WELLAND SHIP CANAL, SHOWING ITS RELATION TO THE PRESENT AND OLD CANALS.

tween the management and the operatives. Were further evidence necessary the employees have given it, in the form of an address which accompanied a presentation made to Mr. Smith recently. At five o'clock the men gathered in the mould loft, where the superintendent, A. M. Stryker, on their behalf, read the following address:—

Gentlemen, you all know what has brought us together to-night—namely, to bid farewell and God-speed to Mr. Smith, who has resigned his position as manager of this company. We are all sorry that we are losing Mr. Smith, and when I say we are losing not only our manager, but a true and trusted friend, I am certain I am speaking the sentiments of every one here. I personally was associated with Mr. Smith long ere he came to Collingwood, and always found him then, as now, a first-class manager and a true friend, one to whom we could go for advice either regarding business or private matters, and be sure of getting from him the willing ear and good advice. Concluding, Mr. Smith, I would ask you to accept as a token of our good-will this purse of gold, which was contributed by the directors and employees of the company. We do not know what new groove you may enter, but we do know that if your future will only be half as bright as those present here wish it, then it will be one to be envied.

Mr. Smith replied at some length, expressing his regret at separating with those with whom he had so long been associated as employer and employee, but wishing all success in the future. He appreciated their expressions of confidence and assured them that the testimonial would long be remembered and revered.

CRUISER STERN BEING FURTHER ADOPTED.

BIBBY & CO., of the well known Liverpool steamship line, have ordered from Harland & Wolff, Belfast, who have constructed the steamers of the Bibby line for many years past, a large liner of the cruiser stern type.

In adopting the cruiser stern, Bibby & Co., are following the lead of several of the other large steamship lines, which have built or are at present building this class of vessel, notably the Canadian Pacific Railway, with their Pacific liners, Empress of Russia and Empress of Asia, and the Allan Line, with their Alsatian and Calgarian.

The new Bibby liner, when she is ready to be placed in commission, will probably be one of the first, if not the first, steamer of this type to enter the East Indian trade, and will afford another evidence of the progressive spirit that animates the present head of the famous line. The new vessel will be built on the lines of the steamship Oxfordshire, which was built by Harland & Wolff two years ago, and which, at the present time, is the largest of the fleet, being over 8,600 tons gross register.

Detroit, Mich.—The Weather Bureau began its new wireless storm-warning service to vessels on the Great Lakes on July 15. The distribution of warnings will be made from the naval radio station at Radio, Va., in the forenoon of each day. The Great Lakes will be divided into upper and lower lakes. Warnings will be in ordinary language and will cover 24 hours from time of issue.

Marine Hardware, made by the Michigan Wheel Co., Grand Rapids, Mich., is fully described in catalogue B 14, just received. A complete line of equipment for motor boats is covered, including reverse gears, clutches, propellers, steering wheels, boat fittings, etc. Each line is illustrated and described, special attention being given to propellers. Prices are given on each item.

VESSELS WINTERING AT SARNIA, ONT.

CANADA'S ATLANTIC SEABOARD

Shipping and Shipbuilding Enterprises and Industries are Again in the Ascendency in Our Maritime Provinces, and Revival of the Old-Time Activity Appears Imminent

C.P.R. ATLANTIC LINER MISSANABIE.

ADDITIONAL particulars are available of the twin screw steamship Missanabie, built by Barclay, Curle & Co., Glasgow, Scotland, for the Liverpool-Canadian service of the Canadian Pacific Railway Co. The following are the principal dimensions of the vessel: length, 520 ft.; breadth, 64 ft.; depth, 41 ft.; gross tonnage 13,000 tons; displacement 18,000 tons; cargo capacity 40,000 cubic ft. Below the level of the main deck, the space is devoted to general cargo, while three of the lower 'tween decks are fitted for the carriage of refrigerated merchandise.

Passenger Accommodation.

From the main deck upwards through no less than six separate decks the entire space is devoted to passengers, of which cabin passengers (berthed in large airy rooms) total 520; third-class (all in large rooms) 1,200; crew 300; a grand total of 2,020. On the main or F deck, which is the lowest passenger deck, all the accommodation is portable, and can be removed at very short notice. A large commisariat department, extending the full width of the ship, provides cold storage for the more perishable table supplies.

On the upper or E deck are placed the dining saloons. the main saloon being forward, and the third-class, which is in duplicate, placed aft. Between the two saloons the entire space amidships is occupied by the culinary department with its attendant auxiliaries, while the remainder of the deck space is taken up by third-class living rooms. The shelter or D deck, contains an overflow third-class dining saloon, the fittings of which are portable, and when not in use can be used as recreation space, while at the aft end is a ladies' room for third class.

Following in due order is the lower promenade or C deck, at the extreme aft end of which are the third-class entrance, smoking-room and hospitals. At the forward end is another entrance house for third class, while abundant promenade space for this class is provided adjacent to these houses. The midship area is entirely occupied by cabin passengers in two, three and four berth rooms. Immediately above on the upper promenade or B deck is the cabin smoking-room with cafe verandah at aft end and card-room adjoining. Amidships is the drawing-room and the lounge at forward end. A feature of all these rooms is the great height, which adds considerably to the appearance, while giving increased air space and ventilation. A novel note is struck in the drawing-room and lounge by the provision of bay windows having comfortable recessed seats.

On the boat or A deck entering from the upper promenade deck, is the gymnasium, replete with every ingenious mechanical device for providing the voyager with suitable exercise. The forward end has the Marconi installation, without which no passenger vessel is now complete, also a house containing the emergency dynamo, this latter being entirely independent of the main propelling machinery, so that in the event of any necessity arising, an uninterrupted supply of light and power is ensured for the Marconi installation, the handling of the small boats mechanically and the ship generally.

C.P.R. ATLANTIC LINER "MISSANABIE."

Lifeboat Provision.

The boat deck is entirely set aside for the storage and working of boats, of which there are sufficient for all on board, 32 boats in all being carried, including a motor lifeboat. The launching arrangements are very complete, and anticipate every contingency which human ingenuity can provide for. The majority of the boats are in nests of two or three, and the davits in this case, have a mechanical contrivance which enables the boat to be launched though the vessel may have a considerable list. In addition, two sets of Babcock & Wilcox patent davits are fitted, which, in conjunction with a tramway, render it possible to launch the lifeboats from either side of the ship. It is worthy of note that there are no collapsible lifeboats on board, all being of rigid open type.

Heating and Ventilating.

The heating and ventilating system is an outstanding feature, and represents an entirely new departure. The system is a dual one, consisting of two distinct methods, whereby every space on board is ensured of a sufficiency of heat and fresh air. There is first a **thermo tank** system, supplying heated air, and capable of maintaining an even temperature of 65 deg. Fah., even in the coldest weather. Secondly, there is a combined system of steam heating and warmed air which is really sub-divided into two separate and distinct methods used in collaboration.

The first sub-division makes use of live or exhaust steam at a pressure not exceeding 5 lbs. per square inch, uniform circulation being maintained by means of a vacuum at the exhaust end of the system. A complete range of piping is fitted, with radiators at convenient points, each apartment having an individual control valve.

The second sub-division is again divid-

ed into two independent methods, viz., a warm air inlet and an extraction plant, each being capable of providing an air change of 1,000 cubic feet per occupant per hour in living rooms, eight changes per hour in galley space. The value of this system lies in the fact that, by the use of low pressure steam in conjunction with a vacuum, equal warming throughout is ensured while avoiding the undue dryness and oppressiveness inseparable from systems where the air is heated to a very high temperature.

SHIPPING LUMBER FROM HALIFAX, N.S.

Electric Lighting.

The electric lighting system is very complete, and comprises over 1,300 lights, special attention being paid to the lighting of the boat positions. The electric power supply is also an extensive one, comprising fans, lifts, barbers' equipment, printing, submarine signalling, and galley outfit. The generating plant consists of three sets of turbines coupled to D.C. generators, the output of each set being 100 k.w. at 100 volts. All watertight bulkhead doors are electrically operated, and can be closed simultaneously from the bridge.

Hull and Equipment Features.

The vessel is fitted with the now well-known cruiser stern, which the builders claim gives increased capacity, speed and deck area, while the hull is extra well strengthened forward to withstand the rigours of the ice season in the North Atlantic. The hull is so divided by watertight decks and bulkheads as to be capable of floating in a seaway with any three compartments open to the sea. The cargo handling arrangements are very complete, three derricks and two powerful winches to each hatch, and in addition at No. 2 hatch there is a lattice girder heavy derrick capable of dealing with weights up to 25 tons. Steam steering gear is fitted on the lower deck well below the waterline, with reserve gear also operated by steam.

Propelling Machinery.

The propelling machinery consists of twin sets of quadruple expansion engines balanced on the Yarrow, Schlick, and Tweedy system. Steam is supplied by eight single-ended boilers at a working pressure of 215 lbs., which it is anticipated will give the vessel a sea speed of 16 knots on service. Although also carrying a cargo, the vessel is primarily designed for the conveyance of passengers, and so far as her type is concerned, in point of comfort, elegance and stability, she will be equal to the best afloat.

The vessel has been constructed under the personal supervision of Major H. Maitland Kersey and his staff — Mr. Gray, Captain Forster, Mr. Gillies, Mr. Baird, Mr. Bell, and Mr. Russell. The christening ceremony was performed by Mrs. G. McLaren Brown, wife of the European manager of the Canadian Pacific Railway Company.

PICKLED FISH EXPORT, HALIFAX, N.S.

MAY CLOSE SHIP REPAIR PLANT.

OWING to there being little or no work in hand at the present moment at the Davies Shipbuilding & Repairing Co. works at Levis, the plant, which is the oldest ship-repairing concern on the St. Lawrence, may shortly have to close down. Most of the employees are expert mechanics, and they are certain to leave for the States, where work can be secured at the present time. It is pointed out that it would be extremely difficult to get them to return should they be required in an emergency.

Shipping men feel that, in view of the war crisis and particularly the prospects of danger to shipping, some steps should be taken to prevent the yards from being closed down, as all the ship-repairing plants on the St. Lawrence may yet be urgently needed. In some quarters it is suggested that the Government should step in and prevent if possible the almost

certain loss of a large number of skilled mechanics who might be urgently needed at any moment.

AQUITANIA'S ART GALLERY.

THE new giant Cunarder Aquitania, which has already made several Atlantic voyages, possesses many wonderful features, but none is more interesting than the long gallery. This apartment—in its conception and realization—is unique in the history of Atlantic liners. Nothing similar has ever before been installed upon any pas senger-carrying ship. It is not a small innovation—it is an essential part of the scheme of historical illustration embodied in the passenger accommodation of the Aquitania.

The long gallery stretches for nearly 150 feet, from the first-class smoking room to the lounge. On the port side large sash windows overlook the deck promenade and the sea. The walls are panelled in mahogany and are painted a delicate eau-de-nil green. The whole is reminiscent of Christopher Wren and the Kensington Orangery. The period of decoration chosen is dated about 1780. and is of the Colonial or Adam style, with which the black and grey tiling of the floor harmonizes admirably. This gallery or arcade is essentially a place where passengers may promenade, or rather stroll, for its beauties are so varied that leisure is necessary to examine them.

Prominent amongst its features are the vecrines or show-cases which will contain exhibits of jewelry, china, lacework, prints, and other obects of art. These, in themselves, would be of sufficient interest to establish the unique character of the gallery, but just as vital to the scheme are those magnificent prints which will adorn the walls, making it not only a gallery of art, but one of history as well.

Particularly appropriate are also the old prints of English seaports in the early part of the eighteenth century. There is included Liverpool, the birthplace of Transatlantic steam navigation; Deptford, where the "goodlie shippes" of the 16th and 17th centuries were built; Greenwich, with its Royal Hospital for seamen; Plymouth, one of whose indissoluble links with the new world is the Mayflower; Bristol, the home of Sebastian Cabot and of Wm. Penn's father, and Harwich, which witnessed the stirring scenes of the Dutch Wars. The more personal side of 18th century history has representation by the admirable series of engraved portraits, such as that of Prince William Henry, third son of George III., who visited New York in 1781-82; that of Nelson, the international sea-hero; and those of Handel, Samuel Foote, David Garrick, John Kemble and Edmund Kean, whose art knew neither the bounds of time nor space.

This is part of the plan which will make the Aquitania supreme in an age of beautiful vessels, and it deals with only one out of the many wonderful sections of the ship.

Canadian Vessel Captains and Chief Engineers

Through the courtesy of the various Companies, we are enabled to give a list of 1914 season vessels, together with the names of their above-and-below-ship principal officers.

MERCHANTS' MUTUAL LINE, TORONTO.

Vessel.	Captain.	Chief Engineer.
A. E. Ames	T. S. Patterson	L. McMillan
Beaverton	O. Patterson	H. Myler
H. M. Pellatt	N. McKay	W. Param
J. H. Plummer	W. O. Zealand	A. McCauley
Mapleton	A. G. McKay	E. Spenser
Saskatoon	W. Honsberger	J. H. McHattie

COAST STEAMSHIP CO., VANCOUVER.

Vessel.	Captain.	Chief Engineer.
British Columbia	G. Foellmer	J. Ellison
Celtic	J. Finlay	A. C. Ritchie
Clansman	M. F. MacDonald	H. Nissen
Fingal	R. W. H. Lloyd	H. Spencer

BAY OF FUNDY STEAMSHIP CO., MARGARETVILLE, N.S.

Vessel.	Captain.	Chief Engineer.
Brunswick	H. W. Moore	G. Snow
Margaretville	S. Baker	L. Harris
Ruby L.	C. D. Baker	A. B. Dorman

QUEBEC TRANSPORTATION AND FORWARDING CO., QUEBEC.

Vessel.	Captain.	Chief Engineer.
Florence	V. Gendron	O. Croteau
J. A. Hackett	J. Thibault	A. Legendre
M. A Hackett	M. Allison	J. Blanchet

BRITISH YUKON NAVIGATION CO., VANCOUVER.

Vessel.	Captain.	Chief Engineer.
Canadian	J. T. Douglas	J. P. Bourne
Casca	J. O. Williams	J. R. Gaudin
Dawson	C. H. Bloomquist	J. P. Young
Gleaner	J. G. Roberts	J. Lauderdale
Nasutlin	J. Doddridge	R. C. Hawes
Scotia	J. McDonald	D. Sullivan
Selkirk	G. H. McMaster	W. C. Vey
White Horse	W. H. Turnbull	P. Larssen

MAGNETAWAN RIVER AND LAKE STEAMBOAT CO., BURKS FALLS, ONT.

Vessel.	Captain.	Chief Engineer.
Armour	J. Mostnner	F. Dunn
Gemada	W. W. Kennedy	E. Goldthorpe
Gravenhurst	S. Carswell	M. Pritchard
Thessa	W. Keitch	C. Rooflack
Waiuta	P. Lawson	T. McPherson

CAPE BRETON ELECTRIC CO., SYDNEY, N.S.

Vessel.	Captain.	Chief Engineer.
Hygeia	A. McLeod	R. Dickson
Pawnee	J. Brown	A. Campbell
Peerless	I. H. Lewis	J. B. Weeks

DOMINION STEEL AND COAL CO., SYDNEY, N.S.

Vessel.	Captain.	Chief Engineer.
Alden	A. Holting	A. Lindejos
Batiscan	G. G. Green	E. R. Evans
Blackheath	M. H. Scott	A. J. Brewer
Cabot	Jas. Lintlop	R. Patterson
Cacouna	J. L. Newman	A. Stevenson
Corunna	J. A. McDonald	Jas. Downie
Coban	A. McPhail	R. A. Richards
Cape Breton	Jas. Kemp	S. A. Stevens
Easington	J. Stevenson	M. Robb
Fimreite	J. Mortensen	H. Amundsen
Fornebo	G. Maxfield	.....
Glendene	F. Corner	W. H. Watt
Heathcote	A. D. Muir	S. O. White
Felix	J. Johnsen	N. Nottosen
Hochelaga	W. G. Tudor	O. C. Shaw
Kamouraska	D. Morgan	W. P. Lowe
Kendal Castle	H. Harvey	W. Brown
Kronprins Olav	P. A. Nilsen	S. B. Olsen
Lingan	T. Garbutt	C. B. Smith
Louisburg	K. Marsters	G. G. Miller
Maskinonge	B. Griffith	G. K. Seddon
Monkshaven	J. E. Milburn	A. Wright
Morwenna	L. Holmes	John Scott
Nevada	J. A. Willett	S. E. Bonner
Stigstad	A. Larsen	J. Engecretson
Sandefjord	K. Hansen	N. Jeros
Skogstad	G. E. Hansen	C. Hansen
Stiklestad	C. Lodrey	J. Granholt
Storstad	T. Andersen	G. Syvelsten
Wabana	D. Reside	J. E. Spedding
Wagama	J. Ostervold	O. Halsen

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PRINCIPAL CONTENTS.

THE WAR AND SHIPPING.

AS in every other sphere of commercial and industrial enterprise shipping of every class and kind all over the world has become more or less involved in the European war mesh. The extremely hazardous conditions existent for a week or two after the war declaration have now happily passed into memory, thanks to the strategy and intrepidity of the allied battle fleets. The disorganization of ocean sailings for the time being was sufficiently complete to make its effects felt on our inland waters trade and commerce which, taken in conjunction with an unsettled public mind and consequent hesitancy of pleasure-seeking, made serious inroads into the passenger as well as freight receipts of our steamship lines. That it will be a lean year for at least all connected with our inland lakes and coastwise marine goes without saying, but there is this consolation about it that they are in good company and plentiful, the experience being almost universal so far as business enterprise is concerned.

That the war may be of short duration and decisive is, we feel, the generally expressed desire, and, as the supremacy of our Empire is so largely dependent on the navy, it should be encouraging as to the outcome that the ships of that navy were built in British yards by British hands, and are manned by British seamen, a triple cord of fitness in the stress and strain of battle.

One result of the war will doubtless be to give an impetus to shipbuilding, both merchant marine and naval, within the Dominion, a consummation not without compensation for the inconveniences and hardships which the war has occasioned.

COMBATING THE MENACE TO WORLD-WIDE FREEDOM.

CANADA IS AT WAR. Although hard of realization because of our distance from the territory in which the nations of Europe are so involved, 'tis nevertheless true. As a nation within an Empire to whom honor, freedom and right made duty clear, we are out to help wipe out the menace and crush the octopus of militarism which for years has kept Europe sitting on a powder barrel, so to speak; generally retarded the progress of civilization over all the world, and kept in chains and slavery a people who in spite of the latter have shown themselves to be worthy of a wider and higher field of effort.

We are at war now instead of later, because the time seemed opportune to the Kaiser, and to those moral degenerates who pampered his inborn whim of a world dictatorship. We are not at war with the people of Germany, but on their behalf for, could they now express it, there would be found hearty appreciation of the activities against the yoke of autocracy.

Whether the war be long or short, its termination will only materialize when freedom from the curse of militarism has been achieved, and the men and women of Germany have opportunity to turn their universally admitted talents to higher and nobler purposes. We are enthusiastic in Canada, because at one with the whole Empire in the determination to exterminate this military fanaticism once and for all, but we must needs be sober and be prepared to make the every sacrifice demanded.

This is no time for **hoggishness**, individual or otherwise. Practical demonstration has been given of what individualism can do in the matter of the Hospital Ship, and the Canadian Pacific Railway Co. management as has been their wont are again to the front with full handed patriotism, an example of corporation generosity. Canada and the Empire expects all of us to do our duty. If we need not fight, it is because others are doing it for us, therefore let us at least acquit ourselves like men by sacrifice to keep our commerce and industries as close to normal as possible. It will be worth while, for of the ultimate outcome of the struggle there need be no fear because right is might. When the smoke of battle has passed, this old planet of ours will realize a prosperity hitherto undreamed of, much less attained, for the war spectre which aforetime stalked abroad stifling civilization and crushing humanity will have vanished in thin air. Needless to say, we in Canada will participate largely in that prosperity.

CANADIAN SHIPBUILDERS—No. 1

PHILIP LESLIE MILLER, naval architect and general manager Canadian Vickers, Ltd., shipbuilders, ship repairers, engineers and boilermakers, Vickers Bldg. and Naval Construction Works, 3072 Notre Dame St. Longue Pointe, Montreal, was born in Dundee, Scotland, May 27, 1876, the son of Alice (Waterston) and James William Miller, M.D. He was educated in the High School of his native town, following which he served a five years' apprenticeship with Gourlay Bros. & Co., shipbuilders, also of Dundee. He next spent one year at St. Andrew University.

In open competition Mr. Miller gained a free studentship and Admiralty scholarship, entitling him to a three years' course in Naval Construction at the Royal Naval College, Greenwich, which he completed and qualified at the final examination in 1901.

PHILIP LESLIE MILLER

He was appointed by the British Admiralty to the Royal Corps of Naval Constructors, serving with such for twelve years in the construction department of the Admiralty and of the Royal Dockyards at Portsmouth, Hong Kong and Malta.

He supervised construction of warships on the Clyde on behalf of the British Admiralty from 1908-1911, and was lent by the British Government to the Turkish Government in the latter year to supervise construction of Dreadnought battleships being built in England for the latter. Mr. Miller resigned from this position and from the Royal Corps of Naval Constructors in 1913 to take his present position at Montreal.

He married Flora Margaret Baxter, daughter of Arthur Baxter, Blairgowrie, Scotland, Nov. 5, 1906.

His clubs are the Engineers, Outremont and Kanawaki Golf, Montreal, while his recreations are golf and music. He is also a member of the Institution of Naval Architects of Great Britain.

In religion, Mr. Miller is a protestant, and his residence is 164 Crescent Street, Montreal.—Photo, courtesy of International Press.

Marine News From Every Source

North Vancouver, B.C.—The actual construction of the Dominion Shipbuilding, Engineering & Drydock Co. plant was started the early past of August.

Welland Canal Accident.—The steamer Sarnor carried away two head gates of Lock 8 about eleven o'clock on the morning of July 27. There was, as a result, considerable delay to navigation.

Victoria, B.C—The G. T. P. steamer Prince John, which sailed for Prince Rupert recently, had among her cargo a shipment of 150 tons of machinery for the Prince Rupert drydock brought to this coast from New York by the Maple Leaf steamship Santa Rosalia.

Goderich, Ont.—The new foghorn, which has been in course of erection here for some time, was blown this month for the first time, the current being turned on by E. N. Lewis, M.P. The new horn is the loudest on the lake and is operated by compressed air.

Quebec, Que.—The Saronic, of the Canada Steamship Lines, which has been doing service for the company on the north shore route, has been taken off, and will be laid up at Sorel. The service will in future be conducted by the steamer Laurentian, formerly the King Edward.

Collingwood, Ont. — After a short trial trip round the bay, the new freighter, J. H. G. Haggarty, started off on her maiden voyage on August 3, her destination being Detroit. Captain Williams was in charge, while Capt. Inkster was also on board for the purpose of adjusting the new ship's compasses.

Kingston, Ont.—It is reported that the Canada Steamship Lines, Ltd., is negotiating for the purchase of Garden Island, opposite Kingston, which is owned by the Calvin Co. It is stated that it is the intention to use the island for a shipyard, where its western steamers will be quartered during the winter months.

Port Arthur, Ont.—Plans are before the Public Works Department at Ottawa, for the removal of the breakwater in the harbor between the Canadian Northern and Horne elevators and the building of a new breakwater between the same points one thousand feet further out in the bay. This work will be done so as to give more harbor room within the breakwater.

Pacific Coast Hospital Ship.—Equipped as a hospital ship, the Grand Trunk Pacific steamer Prince George, has been chartered by the naval authorities for service on the Pacific Coast. She is in command of Captain D. Donald, who has been connected with the G.T.P. northern service for many years. The regular officers and crew were under orders to remain by the vessel while under charter to the Government. A special naval officer has been assigned to act with Captain Donald.

Toronto, Ont.—The Toronto Board of Harbor Commissioners will not, it is announced, revise its plan for work because of the war in Europe. It is estimated that a million and a half dollars will be expended upon harbor improvements here this year and a couple of millions next year. The reclamation of land in the industrial district around Ashbridge's Bay, now in progress, will continue, so will the construction of retaining walls for docks from Cherry street eastward, and of the new ship channel. About 1,000 skilled and semi-skilled workmen are now employed upon the harbor improvement work and no diminution of the force is anticipated.

Largest Gasoline Yacht.—What is said to be the largest gasoline-driven yacht in the world is the Florence, now under construction in a Boston shipyard. This vessel is 154 feet long, with a 20-foot beam and a draft of 7 feet, and will be propelled by two 200-h.p. gasoline engines. Two smaller gasoline engines will be used to supply electric current for lighting the boat and operating the searchlight, as well as for hoisting the anchors, hoisting small boats into the davits, operating the air compressors, and for numerous minor purposes. In the yacht's tenders two gasoline 6-cyl. marine engines that are considered among the smallest of their type in the world, are being installed. The cylinders of these engines have a bore of 2¼ inches and a stroke of 3 inches, and each engine is rated at 7½ horsepower.

Freight Carrying Record.—Some idea of the carrying capacity of the greatest of the lake freighters recently constructed is given by an inspection of the statistics of the cargo carried by the Canada Steamships Line steamer W. Grant Morden, since its first trip from Port Arthur on May 9 for Port Colborne. On that trip she carried 419,000 bushels of wheat, and on the return trip she carried 12,168 tons of coal. On May 29 she left Port Arthur with 538,558.20 bushels of grain, made up of 258,558.20 bushels of wheat and the remainder of oats. In all the succeeding voyages she has been carrying from 12,000 to 12,500 tons of coal or ore. It is said that this vessel could take in two trips the major part of the million bags of flour which the Dominion Government has offered the British Government for use during war time.

St. John, N.B.—In pushing forward the harbor and industrial development at East St. John, N.B., three hundred workmen, one powerful suction dredge, three high-power elevator dredges, an ocean tug, five locomotives and ballast trains, two steam shovels and other accessories, are in service by the Norton-Griffiths Co. The firm have almost completed an immense breakwater of stone; have reclaimed over twelve acres of land for a ship repair plant; have excavated about one-third of the site for a dry dock, and have made considerable progress in dredging berths inside the breakwater for ocean commerce and in widening and deepening the entrance channel. Next spring they expect to begin the construction of concrete and steel cylinder quays for ocean berths, and a pier at the entrance to the dry dock. Their contract, which expires in 1917, covers the supply of twenty-three steamship berths and involves an expenditure of over thirty million dollars. It is expected that this particular point will be utilized by the Grand Trunk Pacific Railway.

Victoria, B.C.—Much more rapid progress will be made in laying the foundations of the Ogden Point piers now that arrangements have been completed by the contractors, Grant, Smith & McDon-

nell, for the immediate shipment of rock from the new quarry at Esquimalt. This quarry is rapidly being got ready, and it is understood that the first scowloads will be transported from Esquimalt to the pier site within the next few days.

Esquimalt, B.C.—While she is being overhauled at the Esquimalt yards of Yarrows, Ltd., the British steam trawler Onward Ho will have complete oil-burning equipment installed. The Onward Ho is undergoing overhaul and slight repairs made necessary by her long voyage from the Tyne to Vancouver. She is owned by the B. C. Packers' Association, and is to engage in the coastal fishing industry.

The Polson Iron Works, Toronto, launched this month the hydraulic dredge Tornado, which is being constructed for the Canadian Stewart Co. The dredge, which is the second of the two 24-inch hydraulic dredges to be used on the Toronto harbor improvements, was christened by Miss Bessie Stewart, daughter of Dr. A. M. Stewart of the Canadian Stewart Co., in the presence of a large crowd.

Shipyard May Close Down.—It is reported that the Davie Shipbuilding & Repairing Co., of Levis, Que., may shortly close down. This is one of the oldest ship-repairing concerns on the St. Lawrence, and in their drydock many vessels have been overhauled and repaired. There is little work at present on hand, and as immediate prospects are not good, the plant may be temporarily shut down.

Montreal, Que—A quick piece of work has just been accomplished at the Canadian Vickers drydock at Maisonneuve, the collier Stigstad, which is a sister ship to the Storstad, being docked, scraped and given two coats of paint and released again all within the short space of sixteen hours. The shipping community will be glad to hear of the rapidity with which such jobs can be handled by the new plant.

Ottawa, Ont.—Captain Lindsay, superintendent of pilots, has submitted a report to the Department of Marine favorable to the recommendation of the Mersey Commission, that pilots be taken on and put off at different points on the St. Lawrence, thus obviating the crossing of courses. The exact points where this will be done will be determined when the Shipping Federation is heard from. The federation is consulting its captains in regard to the matter.

Toronto, Ont.—On Sunday morning, August 16, the dredge Shuniah, owned by the Great Lakes Dredging Co., and rented to the Harbor Commission, sank in twenty feet of water in the eastern part of the harbor. At the time of the accident the cook and his wife were the only persons on board the dredge. They were awakened from their sleep by the night watchman of the harbor dredges, and taken to safety with considerable difficulty. The cause of the accident is not known. It is claimed that a sea-cock was left open. However, this cannot be confirmed.

Victoria, B.C.—The C. N. R. has let a contract for the construction of a dock at Patricia Bay in preparation for establishing car ferry facilities at its Vancouver Island port. Work is to be started shortly, and the wharf is to be ready within two months. S. Doe, of Victoria, was the successful tenderer, a large number of bids being submitted. The dock proper will be 441 feet long and 61 feet wide, and will be approached by a long pier 1,700 feet long. A trestle will be built on one side for unloading the large consignments of steel which are now en route from the Atlantic coast for the Vancouver Island lines of the C. N. P.

Victoria, B.C.—The contract for the grading of the Marine Depot site and construction of the wharf on the eastern shore of the Songhees Reserve has reached such a stage that the contractors, Parks, Tupper & Kirkpatrick, are confident that the work will be completed by the end of this month. The excavation is about three-fifths complete, in spite of the fact that this section of the contract has been greatly retarded recently owing to frequent shallow upcroppings of solid rock, with the result that the big steam shovel was unable to continue operations until the rock had been removed. The total length of the wharf will be 650 feet, running 424 feet north and south and 225 feet inshore.

St. John, N.B.—Wharf building at Courtenay Bay will be started on May 1, 1915, according to word given out by the Board of Trade Committee after a visit to site of the new harbor recently. The first crib will be sunk on the western end of the bay near the foot of Union Street. The committee, consisting of the chairman, P. W. Thomson, Allan H. Wetmore and J. Hunter White, accompanied by the secretary of the Board, R. E. Armstrong, inspected the works in the morning and the chairman said afterwards that good progress was being made on the breakwater, dredging and other operations. Three hundred and fifty men are employed. Norton Griffiths Co. are the contractors.

Toronto, Ont.—The third lighter built by the Polson Iron Works for the Dominion Government for use in Hudson Bay, was successfully launched at the company's yards this month, in the presence of a large and distinguished gathering. The craft, which is 128 feet long over all, 21 feet 6 inches wide, and seven feet in depth when loaded, was christened by Miss Louise Miller. It is expected to have the vessel completed within the present month, and on its way to the northern waters. Among those present at the launch were: Col. J. B. and Mrs. Miller, Mrs. Lee, Mrs. Miller, mother of Col. Miller; Captain James B. Foote of the Toronto Insurance and Vessel Agency; T. H. Benson, inspector for Lloyds at this port; Harry Miller, Mrs. William Newman, Mrs. B. H. Henderson, and Inspector Crooks of the Department of Railways and Canals.

Quebec, Que.—The tug Laval, destined for harbor service, and built in Middlesborough, Eng., for the Quebec Harbor Commission, arrived on August 8, and is moored in the Basin alongside No. 10 shed. The tug is a compact and trim craft of 124 tons. She was designed by John Reid & Co., naval architects, of Montreal, and built by Smith's Dry Dock Co., Ltd., Middlesborough. The Laval, which will be utilized for general harbor work and salvage purposes, is fitted with a powerful searchlight of 16,000 candle power, also fire-fighting appliances, there being connections for six lines of hose. The tug is also provided with a powerful towing winch. The tug was brought over here in command of Capt. Dillon. Some twenty-one days were consumed in crossing the ocean and reaching port, and although some rough weather was encountered the vessel behaved splendidly.

Vancouver, B.C.—Actual construction work on the big drydock undertaking of the Dominion Shipbuilding Co. here will start shortly, when a gang of 500 men will be set to work on the wharves and slipways which will constitute part of the undertaking. The amount to be expended on the enterprise will be $2,500,000, and it will be a couple of years before the plant is prepared to handle ships. According to the plans of the company, a floating drydock, capable of lifting big vessels, will be built and shops equipped to carry out the largest kind of repair jobs will be set up. The company will become a strong competitor of the Seattle Construction and Drydock Company, of Seattle, which at present is securing the big repair contracts. The Dominion Shipbuilding Company will have a most extensive plant, and it will equal any on the coast. The work of dredging, filling and laying out of the foundations will be commenced at once, and then the superstructures will be erected. The first two buildings to be completed will be the machine shop and boiler shop, also the plant of the Mainland Ironworks of Vancouver, which has been absorbed by the new undertaking.

ASSOCIATION AND PERSONAL

A Monthly Record of Current Association News and of Individuals Who Have Been More or Less Prominent in Marine Circles

John Philip Holland, inventor of the "Holland" submarine, died on August 12, at his home in Newark, N.J., aged 72 years.

James Carruthers, the well-known grain merchant, and president of ehe Canada Steamship Lines, celebrated his sixty-first birthday recently.

Captain Harry Parsons, a prominent Victoria mariner, successfully passed the necessary examination for a pilot's certificate, and has been assigned to the D. G. S. Malaspina.

Captain W. E. Holmes, of Victoria, B.C., died on July 13, at Seattle, Wash. Capt. Holmes, who was a well-known navigator on the Northern Pacific, was born in London, England, in 1875.

Captain Lawrence Thompson, a Victoria navigator, long connected with coastal shipping, has been appointed to act as a special pilot, and has taken up his duties on the D. G. S. Galiano.

Jas. M. Smith, who has been manager of the Collingwood Shipbuilding Co., for a number of years, has resigned. On his retirement he was presented with a purse of gold on behalf of the firm and its employees. Mr. Smith has not yet decided whether he will still remain in Collingwood or not.

W. Grant Morden, of Heatherden Hall, Iver Heath, Bucks, England, and Montreal, Que., has been gazetted honorary lieutenant-colonel of his former regiment, the 6th Duke of Connaught's Royal Canadian Hussars. Mr. Morden's residence in England is in connection with the completion of the plans of the Canada Steamship Lines, Ltd., which he has promoted from the outset.

LICENSED PILOTS.

River St. Lawrence.—Captain Walter Collins, 43 Main Street, Kingston, Ont.; Captain M. McDonald, River Hotel, Kingston, Ont.; Captain Charles J. Martin, 13 Balaclava Street, Kingston, Ont.; Captain T. J. Murphy, 11 William Street, Kingston, Ont.

River St. Lawrence, Bay of Quinte, Murray Canal.—Captain James Murray, 106 Clergy Street, Kingston, Ont.; Capt. James H. Martin, 259 Johnston Street, Kingston, Ont.; John Corkery, 17 Rideau Street, Kingston, Ont.; Captain Daniel H. Mills, 272 University Avenue, Kingston, Ont.

ASSOCIATIONS

DOMINION MARINE ASSOCIATION.

President—James Playfair, Midland; Counsel—F. King, Kingston, Ont.

GREAT LAKES AND ST. LAWRENCE RIVER RATE COMMITTEE.

Chairman—W. F. Wasley, Gravenhurst, Ont.
Secretary—Jas. Morrison, Montreal.

INTERNATIONAL WATER LINES PASSENGER ASSOCIATION.

President—A. A. Heard, Albany, N.Y.
Secretary—M. R. Nelson, New York. .. ....

THE SHIPPING FEDERATION OF CANADA

President—A. A. Allan, Montreal; Manager and Secretary—T. Robb, 526 Board of Trade, Montreal.

SHIP MASTERS' ASSOCIATION OF CANADA.

Grand Master—Capt. J. H. McMaugh, Toronto, Ont.; Grand Secretary-Treasurer—Capt. H. O. Jackson, 376 Huron St., Toronto.

GRAND COUNCIL, N.A.M.E. OFFICERS.

L. B. Cronk, Windsor, Ont., Grand President.
A. F. Hamelin, Montreal, Que., Grand Vice-President.
Neil J. Morrison, P. O. Box 238, St. John, N.B., Grand Secretary-Treasurer.
E. Read, Vancouver, B.C., Grand Conductor.
A. J. Ross, Halifax, N.S., Grand Doorkeeper.
James Gillie and A. E. Kennedy, Kingston, Ont., Grand Auditors.

Alexander Gibb & Co., Montreal, have been appointed agents in the Province of Quebec for Suter, Hartmann & Rahtjens Composition Co., of London, England, manufacturers of anti-corrosive paint and anti-fouling composition.

W. A. Coates, general manager of the Robert Reford Co., was the recipient of a very handsome cigar box from the convention committee of the Canadian Electrical Association, as a token of appreciation of the entertainment extended by him to members and friends of the association on board the Cunard Line Steamship Ascania and the Donaldson Line Steamship Saturnia.

George T. Davie, of Geo. T. Davie & Sons, Ltd., Levis, Que., was in Montreal recently on business, and stated that their drydock and shipyard at Levis had been unusually busy this season, not only with repair work, but also with the building of new craft. They are now completing two ferry boats. One of these, for the Canada Steamship Lines, will ply between Montreal and Longueuil, while the other, for the Corporation of Three Rivers, will run between that city and Ste. Angele, on the opposite side of the river, to replace the old ferry Glaciale, which was sunk some time ago. The Davie Co. has also just concluded a complete overhauling of two tugs, the Musquash and Gopher, for the Quebec Salving & Wreckage Co.

Montreal, Que.—Shipping gossip has it that Thos .Hall, of the Hall Engineering Works, is a prospective buyer of the steamer Port Dalhousie, which is lying at Windmill Point, for sale. The Hall Engineering Works have the contract to repair her, and when questioned regarding her purchase, Mr. Hall stated that he intended looking the vessel over while under repairs, and might be a buyer if satisfied with the terms.

Directory of Subordinate Councils for 1914.

Name.	No.	President.	Address.	Secretary.	Address.
Toronto,	1	Chas. M. Arnott,	94 Hanley Street,	A. J. Fisher,	641 Bathurst St., Toronto.
St. John,	2	Wilmot Pitt	Indiantown, P. O.,	G. T. G. Blewett,	36 Murray St., St. John, N.B.
Collingwood,	3	W. T. Rennie,	Collingwood,	Robert McQuade,	P. O. Box 97, Collingwood.
Kingston,	4	S. M. Murray,	20 Rideau St.,	James Gillie,	101 Clergy St., Kingston, Ont.
Montreal,	5	A. F. Hamelin,	3210 Le Tang Street,	O. L. Marchand,	2378 Clark St., St. Vincent de Paul, P.Q.
Victoria,	6	John E. Jeffcott,	Esquimault,	Peter Gordon,	808 Blanchard St., Victoria, B.C.
Vancouver,	7	Andrew T. Roy,	3812 18th Ave., W.,	E. Read,	Room 8, Jones Bldg., Vancouver, B.C.
Levis,	8	Michael Latulippe,	Lauzon,	S. G. Guenard,	Bienville, Levis, P.Q.
Sorel,	9	John Matte,	Sorel,	Al. Charbonneau,	P. O. Box 132, Sorel, P.Qa.
Owen Sound,	10	Wallace Robertson,	1030 4th Ave. West,	James Nicoll,	714 4th Ave., Owen Sound, Ont.
Windsor,	11	Alex. McDonald,	28 Crawford Ave.	Neil Maitland,	221 London St., W., Windsor, Ont.
Midland,	12	Jos. Silverthorne,	Midland,	Jno. A. Murphy,	Midland, Ont.
Halifax,	13	Robt. Blair,	29 Preston Street,	Chas. E. Pearce,	Portland St., Dartmouth, N.S.
Sault Ste. Mari	14	A. E. Lewis.	Box 563, Soo, Ont.,	Geo. S. Biggar,	43 Grosvenor Ave., Sault Ste Marie.
Charlottetown,	15	J. F. McGuigan,	38 Queen Street,	Lem Winchester,	302 Fitzroy St., Charlottetown, P.E.I.
Twin City,	16	Wm. Faloona,	392 Ambrose Street,	Lloyd Williams,	142 Secord St., Fort William, Ont.

STORY OF BRITAIN'S LIGHT-HOUSES.—I.*

By M. W. Roberts.**

LIGHTHOUSES were known long before Smeaton's day. Their history, in fact, ranges over many centuries of human life; and the Pharos of Alexandria, which existed some 300 years before Christ, and yielded light by means of fires kept burning on the tops, has given its name to a long list of useful and brilliant successors. The Romans, of course, built lighthouses, and it is said they constructed one at Dover (the North Foreland); probably the Phoenicians also erected lights, but of those early structures few, if any, survive. They have passed away like the people who built them. The pier and Monks Ferry were constructed early in the year 1817, while the first steam ferry-boat started on the 4th April, 1817. The Cunard liner Britannia left Liverpool on July 4, 1840.

The Bidston Lighthouse.

In the year 1670 the Corporation of Liverpool petitioned through their member of Parliament, Sir Gilbert Ireland, against a scheme then brought forward for the construction of lighthouses on the coast, as in their opinion they would be confusing to mariners and dangerous to shipping. The lapse of a century had infused a little more wisdom into their minds, and in 1771 Bidston Lighthouse was erected on the highest part of Bidston Hill. The elevated position was also taken advantage of for the erection of lofty flagstaffs, of which a good range extended at one time from the lighthouse to the old wind-mill. Each shipowner had his own signal, which was hoisted by the lookout man when the particular ship was recognized off the port, thus giving a few hours' notice of the arrival. The old church yard, Liverpool, was the resort for catching sight of the signal flags. The Bidston Lighthouse and Observatory dates from 1896, and is now only used as an observatory.

The Rock Perch.

The exact period of the erection of the old Rock Perch is unknown. The earliest chart of the Mersey was published in the reign of Queen Anne, by Captain Collins, from which it appears that the Rock Channel was the only passage used to and from the Mersey. On a ledge of rock at the north-east corner of Wirral, which projects some distance into the sea, stood the rude construction for generations. It was exposed to the ceaseless action of the wind and waves, bidding its silent farewells and welcomes to the mariners of old. Just as many great men have passed away without an opportunity of asserting themselves, so also has the old Rock Perch, which is seldom if ever mentioned, and has been suffered to languish in the cold shade of oblivion.

New Brighton Lighthouse.

On June 8, 1827, the foundation stone of the New Brighton Lighthouse was laid by T. Littledale, Esq. It was built of hardstone quarried in Anglesey, and cemented with a volcanic production from Mount Etna, which becomes harder as time goes on. The plan is similar to that adopted by Smeaton in the construction of the Eddystone. Formerly the lights were revolving, two white and one red. Now it is a revolving white light. Bells are rung during fog, each bell having a different note. It was erected by the Corporation of Liverpool at a cost of about $175,000.

The North Wall Light.

The North Wall Light was established in the year 1877. It shows a group-occulting light every 30 seconds, while the fog siren gives one blast every 30 seconds of three seconds' duration. It is known as the "Bootle bull."

The Leasowe Lighthouse.

About 90 years ago, in 1824, the present Leasowe Lighthouse was built to supply the place of one that previously stood half a mile nearer the sea; which at the time of its erection was firm, dry land; yet the waters not only flowed over it, but threatened to involve the present lighthouse in a similar ruin, until measures were taken for its preservation by raising the Leasowe Embankment by the Liverpool Corporation at a cost of £20,000. After the attempt to burn the town and shipping of Whitehaven in 1778, by the notorious privateer Paul Jones, the authorities of Liverpool were alarmed upon receiving news that he was off our coasts, and they ordered Richard Wilding, upon receiving news of his approach, to give the alarm at Leasowe Lighthouse and at Hoylake, and not to keep the lights burning. The coast was considered extremely dangerous to shipping in stormy weather those days, owing to the numerous shoals and sandbanks.

On January 29, 1839, sad destruction of life occurred off the Leasowe shore when the Harvest Home, Pennsylvania, St. Andrew, Lockwood, and other vessels were wrecked. A great many of the sufferers were conveyed to Leasowe Castle, and after every exertion being used to restore them, most of them died and were buried in Wallasey churchyard.

When the Leasowe Lighthouse was built on the sandy Wirral shore, the builders were puzzled by the lack of a suitable foundation for the masonry tower. An ingenious way out of the difficulty was found. In the vicinity an incoming ship, laden with a cargo of cotton, had gone ashore and had become a total wreck. The cotton was useless for its intended purpose, so the bales were salvaged and dumped into the sand at the point where the lighthouse was to be erected. The fleecy mass settled into the sand, and under compression became as solid as a rock, while its permanency was assured by its complete submersion. The stability of this strange foundation may be gathered from the fact that the tower erected thereon stood and shed its welcome light every night for nearly a century, being discontinued on July 15th, 1908.

In Great Britain an order was issued that "no ale or other intoxicating liquor be allowed to be sold in any lighthouse." The precise reason for this strange ordinance is not quite clear, but it is significant to note that it came into force immediately after the disastrous fire at the Leasowe Lighthouse. A woman, Mrs. Williams, was the keeper of this lighthouse for fourteen years previously to it being discontinued.

N. W. Lightship "Good Intent."

The N.W. ship Good Intent was placed on her station during the year 1813, whilst the present Bar Lightship was placed on her station during last year, just 100 years' difference between the two. The latter vessel is fitted with wireless telegraphy and submarine bell, which gives three strokes every ten seconds.

*From a recent lecture on the subject.
**Chairman, Liverpool Pilots Association, etc.

CHAOS IN SUEZ CANAL.

A CABLE from Port Said says that an unprecedented state of affairs has been created here through traffic in the Suez Canal having practically ceased. The port is crammed with ships. Captains of all nationalities are afraid to proceed; besides, there is a colossal fleet of German merchantmen under seizure. The German ships have been deprived of essential pieces of their engines and their wireless plants, while the whole of Germany's seaborne commerce with Australasia, Asia and East Africa is absolutely paralyzed.

The only vessels passing through the canal are those flying the Italian flag, and these are beseiged by hordes of foreigners anxious to get away from Egypt. Among them are many German and Austrian officers, who have been arrested by British authorities while attempting under disguise to get away. All public services are under military control and all banks are closed. The German residents from Cairo to Alexandria are subject to a triple censorship, and rigid vigilance is being exercised over the native population to prevent any Nationalist rising.

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The Quebec Harbor Commission Service Vessel, "Laval"

The present and projected developments at the port and harbor of Quebec, which will bring back on their completion much of the shipping business lost to Montreal in recent years, call for the acquirement of the most up-to-date marine equipment available. In the tug "Laval," as the description amply bears out, it will be noted that, for the particular work of towing, docking and manoeuvring of large vessels there has been provided an exceptionally well-found accessory.

A FINE example of the modern seagoing tug, specially adapted for St. Lawrence service, was recently delivered to the Quebec Harbor Commissioners on completion of a three weeks' voyage across the Atlantic. The vessel which has been named "Laval" was built by Smith's Drydock Co., Middlesboro, England, to the design and specification of John Reid & Co., of Montreal, who also superintended her construction. She is classed at Lloyds 100 A.1. for towing purposes. The principal dimensions and particulars are as follows:—

Length, b.p., 120 ft.
Breadth, mld., 26 ft.
Depth, mld., 14 ft.
Extreme draft, 12 ft.

Engines T.S.C. $\frac{16—26—43}{30}$

Boiler single ended 15 ft x 11 ft. 9 ins., of 185 lbs. per sq. inch working pressure with Howden's forced draft.

I.h.p. developed on trial, 900.

Speed loaded, 13 miles per hour.

Vessel Accommodation.

The design and lines of the vessel have been specially considered for speed, towing and ice work. She is also specially fitted for salvage work and fire fighting, and has ample accommodation for the members of the Quebec Harbor Commission when cruising in the Gulf. All casings are of steel, the upper section comprising a commodious and well-appointed wheel house and captain's room.

In the forward end of the main casing is the Commissioners' dining saloon, which is very tastefully finished in figured and panelled fumed oak with polished oak flooring, and has dining accommodation for twelve persons. Adjacent is the galley and ice house. In the aft end of the main casing are the officers' bathroom, crew's w.c. and wardrobe, lamp room, steam steering gear and entrance to after accommodation below deck.

The Commissioners' staterooms, five in number, are entered by a panelled oak staircase from dining saloon above, and are finished in mahogany. They are each fitted with two berths, extra large toilets with running water, drawers, mirrors, art cane chairs, rugs and tapestries and portable electrics. Adjacent is a separate bathroom and underline w.c. The officers and crew are berthed aft, separate cabins being provided for two engineers, mate, cook and steward. Here also running water is arranged for two wash basins; in fact, the plumbing arrangements as a whole are on a very liberal scale.

TUG "LAVAL"—BROADSIDE AND FORWARD.

Equipment.

Full provision is made for efficient navigation at sea, the outfit including a Dobbie-McInnis latest improved standard compass with aximuth fitted on top of captain's house. One Ritchie spirit compass is fitted in wheel house. Additional steering facilities are provided on top of wheel house where a 16,000 c.p. searchlight is also installed.

The deck outfit comprises steam windlass and winch forward, and large steam towing winch with massive towing bitts combined at aft end, also heavy derrick and tackle for handling salvage gear. Large bollards are fitted on rails at side for broadside towing. The electric light installation embraces a Robey engine and Holmes dynamo, which serve the searchlight and 77 16-c.p. lamps.

The special provision for working in ice consists of a ¾-inch ice strake of shell plating and frame spacing reduced to 12 ins. forward. The forefoot and forward sections are also specially shaped to this end, and the rudder post is protected by a special forged steel horn.

The fire fighting outfit comprises a special vertical duplex pump, capable of delivering 2,000 gallons a minute, operating through a swivelling monitor situated at after end of casing top or through hose connections at base of

TUG "LAVAL"—BROADSIDE AND AFT.

monitor. Four hose connections are also provided.

The special salvage outfit comprises a 9 in. Bon-Accord centrifugal salvage pump driven direct by a vertical steam engine, with necessary lengths of 9-ins. steel piping, flexible rubber suction hose and flexible metallic steam hose.

The engine room auxiliary outfit consists of one 16½ in. x 15 in. air pump; one 7 inch centrifugal Drysdale circulating pump driven by independent direct acting engine; two 3½ in. diam. bilge pumps; McTaggart-Scott 8 in. x 12 in. reversing engine; Hocking feed heater; Rankin feed water filter; one Weir main feed pump capable of dealing with all feed water at full power; one Weir auxiliary feed pump; one Lamont patent duplex vertical ballast and ash ejector pump; a Penberthy injector; a See's ash ejector and a Howden double inlet fan driven direct by a single double acting open type engine.

The delivery of the vessel was also in the hands of John Reid & Co., who appointed Captain Dillon to bring her across the Atlantic.

ANOTHER ST. LAWRENCE TRAGEDY.

FIFTEEN lives were lost shortly before five o'clock on the morning of September 18, when the Canadian Government steamer Montmagny was rammed by the Black Diamond collier Lingan at Beaujeu Banks, a mile below Crane Island, and some 26 miles below Quebec City. The Montmagny was on her way from Quebec to the Gulf, the Straits of Belle Isle, and Newfoundland, where she was taking the families of two lighthouse keepers, together with coal and other provisions for the wireless stations and the signal service stations down the coast. The boats struck in a bank of fog, not far from Crane Island. The Montmagny was built in 1910 at the Sorel shipyards, her registered tonnage being 722, displacement 1,269, and length 212 feet.

The collision occurred while most of the passengers were asleep, and the Montmagny went down inside of three minutes. The Lingan leaked badly, but continued on her way up to Quebec under her own steam. When she struck the Montmagny, the Lingan was in charge of Pilot Francois Gaudreau, who was in charge of the C. P. R. Montfort when she grounded at Beauport last spring.

Instructions have been issued to Capt. Lindsay, superintendent of pilots, who is at Quebec, to hold a preliminary investigation, and this will be followed by a fuller inquiry by Capt. Demers, wreck commissioner.

The Rule of the Road Practically Explained--I.

By Captain Wheeler, Ex. M., F.L.T.

This series of articles, for the publication of which we are indebted to the Motor Ship and Motor Boat, will serve to clear up many misconceptions that exist concerning the regulations which have been formulated to secure immunity from collision by vessels of all kinds and in all waters.

THE International Regulations for preventing collisions at sea must be followed by all vessels on the high seas and in all waters navigated by sea-going vessels. They are, in certain cases, slightly modified or altered by local authority, but only to suit local requirements for inland waters, and must be strictly followed around the coasts here. When collision occurs, liability for damage will usually be avoided when an owner can prove that his vessel strictly followed the regulations.

These rules consider a steam vessel to be a vessel propelled by any kind of machinery, so that a vessel as an auxiliary motor cruiser using her engines must be classed as a steam vessel. When a steam vessel is proceeding under power and sail she still remains a steam vessel; but when proceeding under sail alone she must be deemed a sailing vessel.

Navigation Lights.

During the night, lights shown by these vessels will denote to others under what class they are to be considered; but in the daytime, when a steam vessel is proceeding under sail only, but having her funnel up, she carries forward, where it can best be seen, a black ball or shape, 2 ft. in diameter. This is a rule not often followed by yachtsmen on powered cruisers, and the rigid carrying out of the regulation by all auxiliaries saves many an anxious moment. A vessel is under way immediately her anchor is raised from the ground or she casts off her moorings; while in the event of her running ashore she becomes moored or anchored and acts accordingly.

The lights for vessels must be shown from sunset to sunrise, no allowance being made for twilight, which varies considerably in different parts of the world. The power of lights must be such as to be visible on a dark night with a clear atmosphere for the prescribed distance.

In large steam vessels a fixed and unbroken white light must be shown in the fore part of the vessel and over a range from right ahead to 2 points abaft the beam on either side, or an arc of 20 points of the compass in all. This light must be carried at least 20 ft. above the hull, and where the beam of the vessel exceeds 20 ft., then at a height equal to such beam, but it need not be carried over 40 ft. above the hull.

An additional white light, of similar construction, may be carried, but it must be at least 15 ft. higher than the forward light when in line with the keel, while the horizontal distance must be more than 15 ft. It is rather a pity that the optional light was not made compulsory, as the position of these two lights with each other indicate the way in which a vessel is heading long before her side lights are visible.

The side lights must be so constructed and fixed as to show an unbroken green light from right ahead to 2 points abaft the beam on the starboard side, and a fixed and unbroken red light from right ahead to 2 points abaft the beam on the port side. They must also be fitted with inboard screens projecting at least 3 ft. forward of the light, so as to prevent the lights being seen across the bows. The white masthead lights must be visible at least 5 miles, and the green and red side lights 2 miles.

The regulations also prescribe that when a vessel is being overtaken by another she shall show a white light or flare-up light from her stern. A flare-uplight is most objectionable, as the glare is apt to blind one temporarily, which is dangerous in crowded waters. There is also the possibility of a flare-up light being taken as a distress signal or a signal for a pilot, and the charges one may incur as expenses in squaring mudlarks and pirates who rush to render assistance on the slightest pretext, would be better spent in acquiring a proper stern light, which shows a fixed and unbroken white light on 12 points of the compass, that is, from right aft to 6 points on each side. The light must be visible one mile, and carried about level with the side lights. A sailing vessel and vessel towed must carry the same lights as a steamer, excepting the masthead lamps, which she must never carry.

The sketch shows the arc of visibility for all the lights, and it will be seen that, both on steam and sailing vessels, one or other light is visible all the time to an approaching vessel.

Towing Lights.

When a steam vessel is towing another vessel, she carries, in addition to her side lights, two white masthead lights. When towing more than one vessel, she carries a third white light, if the length of the tow exceeds 600 ft., measured from the stern of the towing vessel to the stern of the last vessel towed. These lights are all of the same construction,

and are placed in a vertical line one over the other, 6 ft. apart. They are carried in the same position as a steamer's masthead light, excepting the third light, which may be carried at a height not less than 14 ft. above the hull. The towing vessel can also carry a small white light aft for the other vessel to steer by, but this light must not be shown forward of the beam.

To those not well initiated, this rule arouses much argument regarding its application. A large ocean-going vessel may be seen passing along a fairway, using her own engines, and with a tug made fast forward. The former shows her navigation lights, including the masthead light, and the tug is displaying two masthead lights. Some contend that the steamer should not carry masthead lights, as she is being towed; but in such a case as this the steam vessel is under way, using her own power, and being assisted to steer by the aid of the tug. The tug displays two masthead lights to denote that she is made fast to the other vessel, and anyone trying to pass between them is looking for trouble with the towing hawser.

Another point to be noted relates to the number of vessels towed and white lights carried by the tug. If towing one vessel only, two vertical lights are carried, irrespective of the length of the tow, and the towing vessel still carries the same two lights if towing half-a-dozen vessels, provided the distance from her stern to the stern of the last vessel towed does not exceed 600 ft.

The preceding paragraphs must be strictly followed by all vessels regarding the lights carried, but for smaller vessels some modifications are allowed, provided they are steam vessels of less than 40, and vessels under oars or sails of less than 20 tons gross tonnage respectively.

Exempted Vessels.

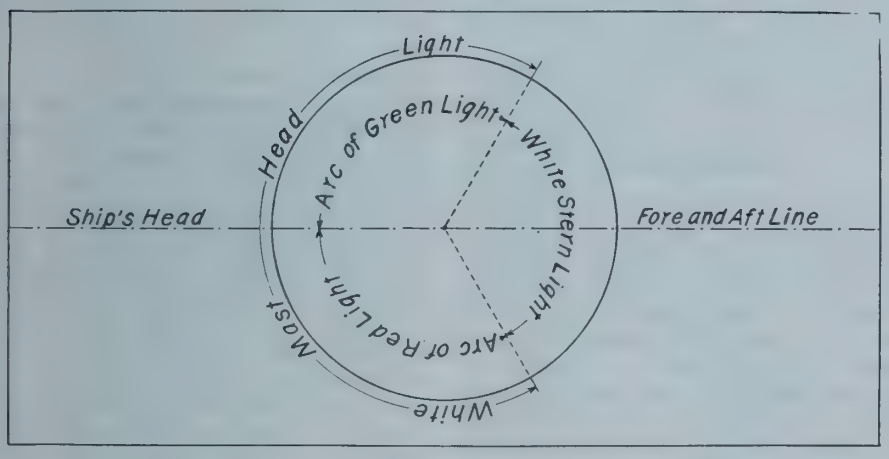
Exempted steam vessels carry forward at a height above the gunwale of not less than nine feet, and where it can best be seen, a white light visible at least two miles. The side lights may be carried in one lantern with green and red shades on their respective sides, or separate lanterns, as prescribed for larger vessels, but the lights need only be visible for a distance of one mile. The side lights must be carried not less than three feet below the white light, but all the lights must be shown over the same arc as those for larger vessels. In no case should a steam vessel (other than a steam fishing vessel) show the white, red and green lights from the same lantern.

Sailing vessels and vessels under oars of less than 20 tons shall have ready at hand a combined lantern with green and red glasses on their respective sides, and when near other vessels show this lantern in its proper position in sufficient time to prevent collision. Row boats, even if under sail, shall carry a small white light, which shall be exhibited in sufficient time to prevent collision.

Nature of Lights.

Whenever possible, lights should be exhibited permanently, no matter how much traffic may be about, as it frequently happens that the sudden sighting of lights on approaching vessels is temporarily confusing, and accidents happen. A large vessel may be proceeding at fair speed up a fairway and suddenly sights a light under her bow. Owing to the speed it is impossible to manoeuvre her in the short distance, and those in charge cannot be blamed for an accident happening. If only a white light had been exhibited continuously the other vessel would have been able to see it in good time, and, knowing it was attached to some object, would take care to keep clear, for a white light denotes other things besides a masthead light. Do not, however, take this to mean that the other vessel is compelled to give way for you, but in some instances he has to do so; therefore, give him as fair a chance as you would yourself desire.

In the case of bad weather, when it is not possible to keep the lights in their positions, have them at hand ready to exhibit on the approach of other vessels, and to avoid the risk of showing the light on the wrong side have the lanterns painted the same color as their respective lights.



ARC OF VISIBILITY FOR NAVIGATION LIGHTS.

Fishing Vessels.

Fishing vessels, when not engaged in fishing, show the same lights as other vessels, and follow rules prescribed for other vessels, but when they are engaged in fishing give them a wide berth, not only because it is your duty, but to prevent damage to nets and the possibility of fouling your propeller.

According to the kind of fishing being done, so are their lights prescribed. Open boats when engaged in fishing at night, show an all-round white light if their tackle does not extend more than 150 ft. into the seaway. Such a light being also shown from a vessel at anchor, always give it a wide berth.

When the tackle extends more than 150 ft., a similar all-round white light is shown at least 3 ft. below and 5 ft. away in a horizontal direction from the first light. The lower light is always in the direction of the nets, so go around the side of the higher light.

Vessels engaged in drift net fishing, as long as their nets are in the water, also carry two all-round white lights, but the distance between them is not less than 6 ft. and not more than 15 ft. vertically, and not less than 5 ft. nor more than 10 ft. in a horizontal distance, while they shall be visible for a distance of not less than three miles. The lower of the lights is also shown in the direction of the nets.

Line fishers, when fishing with their lines out, or attached to or hauling their lines, also carry the same lights as a drift net vessel, but when fishing with towing lines, or when shooting lines, they carry the same lights as an ordinary vessel under way.

VESSEL NAMES.

WHILST geographical names are freely made use of by shipowners, this form of nomenclature in fact being amongst the most popular sources from which ships' names are derived, it is not generally known that the Cunard fleet, many of which bear rather peculiar names, are all called after geographical areas or places, though in some instances the old Latin forms are used instead of the modern appellation.

To secure original names, no easy task in these days of thousands of vessels, the Cunard line delved into ancient history, but by doing so obtained for their vessels names which at least are original and for the most part totally unlikely to be confused with those of other lines.

Breakdowns Common at Sea—Their Prevention and Repair*

By R. W. Thompson

From time to time propelling machinery and other equipment break-downs occur, many of which entail loss of life, delay and great expense. The four great contributory causes are usually bad design, careless workmanship, neglectful supervision, and fatigue of material. The article deals with a number of the more common troubles experienced.

IN recent years the marine engine has been brought to a high state of efficiency, both thermal and mechanical, yet there remains plenty of scope for improvement in the minor details of the outfit of a modern cargo vessel. The tendency of the engineering world today is to make all machinery as foolproof as possible, with a view to rendering it as free from breakdown as possible. If we were to visit the engine-room of some large vessel, we should be surprised at the number of valves placed here and there without any indication of their particular duty, or the direction in which they open or close. If the threads on the spindle were exposed to view we might feel quite safe, but with the threads inside the valve chest, who knows whether it is a right-hand or a left-hand thread.

Sometimes we come across valves in such a position that it is impossible to overhaul them, since they foul some permanent portion of the vessel, such as a bulkhead, a beam or a side stringer. There are steam pipes having expansion bends without any means of draining them, which is sure to result in water-hammer and burst pipes; boiler mountings with ⅜-in. gland studs, which either corrode away or the threads strip with very little pressure. We have stuffing boxes which are not deep enough, perhaps only holding two turns of packing. A shallow stuffing box of this description would be best run up with lead, since soft packing will never remain tight. Considerable trouble is given from time to time by the wooden handles which are fitted to indicator cocks, sight-feed lubricators, drain cocks, etc., as they crack and fall off, due to the intense heat and oil. It is suggested that fibre handles would be an improvement. The foregoing are a few of the minor troubles that would cost practically nothing to remedy. There are several other details of a like nature which will readily come to the reader's mind as needful of attention.

Condenser and Accessories.

One of the great sources of trouble with the modern surface condenser is the burst or leaking tube. The first intimation of this will be an increase in the water level of the boilers. This is very undesirable, since salt water carries with it scale-forming matter which will be deposited on the heating surfaces and thus reduce the thermal efficiency. A very effective method of stopping small leaks is to pass sawdust into the circulating pump through its pet cocks. The sawdust will be drawn into the leak and thus stop it. If, however, the leak or burst be large, we must stop the engines, shut down the feed check valves, bilge valves and main injection valve, then take off the man-hole door at top of condenser, and also the examination doors at each end, pass a hose pipe into the condenser through the top door and fill it up with water from the sea. The leaking or burst tube will then be discovered, since water will flow from it. During this process tapered soft wood plugs about 3 in. long should be made, to drive into each end of the affected tube or tubes. The condenser must now be emptied, say, by opening the air-pump suction valve door, and all joints be re-made before the engine can be started again.

Loss of Vacuum.

Another source of condenser trouble is loss of vacuum. This may be due to one or more of the following causes:—Defective air pump, defective circulating pump and insufficient water supply, leaking glands at L.P. cylinder, division plate broken, leakage of air into condenser (bad joints), air locks in water space. A defective air pump is generally caused by one of the head valves becoming broken or worn out.

On one occasion while passing through the West Indian Islands, the suction and delivery valve division plates collapsed, and immediately reduced the vacuum to nil. The ballast pump was at once set to work as a circulating pump to maintain a vacuum, and for two days these conditions prevailed. However, on gaining the open sea, where there was no risk of running ashore, it was decided to attempt a repair to the circulating pump. This was done by making false division plates out of ¼-in. sheet brass doubled and held in position by tap bolts. On arrival in port, the permanent repair was a similar arrangement, only with cast gun-metal plates.

Leaking glands can be detected by holding a light near to the gland, when, if a leak exists, the light will be drawn towards it. A broken division plate allows the circulating water to pass straight from the inlet to the outlet without the water having passed through the tubes. The condenser will be quite hot at one end and cold at the division plate end. We would repair this by fitting a brass, iron or hard wood division plate, and on arrival in port, rather than condemn the whole door, fit a special iron casting similar to the arrangement before the collapse. However, if the door shows signs of being mushy, it should be condemned.

Air leakage is very often difficult to locate; sometimes it can be heard, and, if not, the lamp test must be resorted to. Air locks consist of a portion of air that becomes trapped in the upper portions of the water side of the condenser, and thus prevents water from passing through the top rows of tubes. By fitting an air cock and thus allowing the water pressure to force the air out, we obtain better conditions.

Deflectors or guides should also be fitted on the steam side of the condenser, so as to bring the whole of the cooling surface into action. By carefully noting the temperatures in and around a condenser, we can draw safe conclusions as to its efficiency. A great deal of trouble is sometimes caused when in shallow rivers, owing to mud and sand being drawn into the condenser and choking it up; however, if an upper injection valve be fitted, we should be able to save the situation by drawing water from a level 10 ft. to 15 ft. above the main injection. Not having an upper injection valve, and knowing the nature of the river or harbor under consideration, we should previously have filled any available ballast tanks with water, with a view to pumping this water through the condenser while going up river. Sometimes the main injection valve grid becomes choked, due to seaweed; by stopping the engine for a few seconds this obstruction will be almost certain to release itself. A steam connection to the main injection valve box would have blown the obstruction away. Ice is also another source of annoyance which could be successfully overcome by fitting a steam connection.

Broken Injection Valve Spindle.

To attempt the repair of a broken injection valve spindle without going into

*From a recent address before the Graduate Section of the North East Coast Institution of Engineers and Shipbuilders.

dry dock is almost an unheard-of thing, yet it can be successfully carried out in the following manner:—Arrange a tarpaulin of double thickness over the grid and have the four corners fastened to ropes, so as to keep it in position. Then disconnect the injection pipe and allow the valve to be eased off its face, so as to ascertain the success or otherwise of the tarpaulin as a means of keeping the water out. In the case that I have in view the water leaked in for about ten minutes, and then practically stopped, thus allowing the work to be completed.

Shafting.

The engine shafting should be thoroughly examined at every available opportunity, both for alignment and for surface flaws and cracks. The alignment is tested by either sighting along the couplings or by removing the bolts and passing testers between the coupling faces, thus detecting any error in adjustment, which should be at once corrected. A ship hogs or sags according to the disposition and weight of the cargo. We should at all times keep a look-out for this, since we may have one or two bearings doing all the work and incidentally running dangerously hot. To remedy this, the bearings not taking weight, should be wedged up till they take their share.

The main shafting should be machined all over, to enable surface flaws and cracks to be detected, and should on no account be covered with paint. Surface flaws should be carefully investigated. It is advisable to drill a small hole at each end of the flaw and thus prevent it from spreading. If possible, we should ascertain the depth of the flaw, and having done so, calculate the net area of the shaft, since it may be necessary to reduce the horse-power until a new shaft can be fitted. We can approximate the volume of a flaw by pouring oil or water into it, keeping a record of the amount absorbed.

Repairing Broken Shaft.

If a shaft be broken into two pieces, the ends should be brought together and pieces of plate dovetailed into each portion; this will take the fore-and-aft thrust. We should then fit clamps around the circumference, made out of a square bottom end or a patent coupling. The crank shaft in vessels of moderate power is nearly always made hollow. This is very desirable. Again, we have this hole into which we could fit a bolt or rivet to take the fore-and-aft thrust, in the event of the shaft breaking. The circumference would, however, need to be clamped either by a spare bottom end or some other suitable clamping device.

The tail-end shaft is now generally fitted with a continuous brass liner about ⅝-in. thick, shrunk on to the shaft and held in position by brass or gun-metal set screws which are flush with the liner. Corrosion is one of the principal defects which occur in tail-end shafts, and may be looked for at the beginning of the tapered portion of the shaft adjacent to the liner. If the engine runs in a right-hand direction it is advisable to fit a left-hand screw and nut on the propeller shaft, as the tendency will then be for the nut to tighten up on the propeller. Crank shaft webs occasionally burst, owing to the excessive strain set up in the web after the pin has been shrunk in. They are repaired by passing bands around the web or by plate patches.

Burst Steam Pipes.

A burst steam pipe may be due to a number of causes. Water hammer; local extension of material and then rupture; pipe being too rigid and no allowance for expansion and contraction, the material gradually becoming "fatigued," and thus no longer able to carry the test pressure; defective brazing. The pipe must be isolated from the pressure if the burst or crack is very large. We have the option of fitting a joint over the crack and then clamping this in position by one or more bands passed around the pipe; or we can put a cement muff over the affected part with wire binding. This has in the past given satisfaction. If the brazing has given out, we may cut the flange off completely from the pipe, and if we have not sufficient pipe to join up again after taking what we can out of the expansion bend, we must fit in a distance piece.

Piston Rods.

A piston rod may become bent, due to overheating, and this may be brought about by several causes—engine out of line (fore-and-aft); gland not screwed up parallel; insufficient or no lubrication; too much play between guide shoe and face. The only way to straighten a bent piston rod in place without running grave risks is to let the engine come on to the bottom centre, and then heat the concave side, and at the same time keep the convex side cool by means of a water service; the idea being that the lengthening of the fibres of the concave side will pull the rod back to its normal condition; this may be assisted by the careful use of bottle jacks. Piston rods sometimes wear oval in section, due to the first and fourth causes stated, and also to the rod having soft places running the full length on one side. Rods are very often scored, due to bad packing and subsequent inattention.

Propellers.

Nearly all ships carry a spare propeller and tail-end shaft. The propeller we may find in one of the after holds, or in the 'tween decks, or on deck; this latter would seem to be the proper place, since otherwise it would be necessary to unload the vessel to get at it. The spare tail-end shaft we may find in the 'tween decks or in the poop; it should, however, be in the tunnel recess ready for an emergency. The present way of removing the tail-end shaft out of the tunnel is by taking off a portion of tunnel plating, after having discharged the cargo. This entails a considerable loss of time, probably three or four days. It would, therefore, seem an advantage to have the tunnel recess so constructed that the shaft may be removed through the ship's side. This might require a frame to be cut to allow the coupling to pass through; the aperture thus caused being sealed up by a water-tight cover, removable from the inside.

Formerly, if a piece of one propeller blade was broken off, the others were cut off to match the broken one, and thus preserve a balance. Since the introduction of successful electric welding, however, it is usual to weld a new piece of blade on. In one case, owing to the propeller having struck some floating logs, all the blades were broken. In this condition the ship was making about 2½ miles per hour, and the distance to travel was about 2,500 miles. A land-locked bay being within 60 miles, it was decided to go there and try and fit the spare propeller. The nearest dry dock was about 600 to 700 miles away.

Having found a suitable anchorage, the vessel was tipped until the propeller boss came out of the water. The propeller nut was then eased back about two threads, and the shaft in the tunnel shored up so as to take the strain when the wedges were driven in between the propeller boss and the stern post. A stage was rigged under the stern, from which to conduct operations. After several blows on the wedges the propeller was started back. During these operations preparation had been made to take the weight off the propeller when the shaft was ready to be drawn in. The strongest blocks available were used, and through these were reeved the wire mooring ropes, the loose end of which was taken to a winch. Two sets of blocks were used, each having its own winch. Special wire slings were hung over the counter, one port and one starboard, and from these the blocks were hung. The slings to lift the propeller were then shackled to the lifting blocks. The winches next hauled in the available slack, and the shaft was drawn in. The propeller was then hauled up clear of the water, and a raft floated into the space, on which the propeller was lowered and towed around to the ship's side.

The broken propeller having been lifted on board, the new propeller was then lifted over the side and lowered on to the raft. Care had to be exercised in doing this, as the vessel was rolling somewhat, and the risk of one of the blades piercing the ship's skin great. In due course the propeller was slung into place, the shaft again pushed out, the nut put on and driven up hard, and the split pin put in and opened. The tunnel shafting was then rolled into position and coupled up, and the stern gland repacked.

Rudders.

The rudder post very often shears off close to the quadrant, and if the break protrude from the stuffing box we may be able to clamp the two portions together or cut a fresh key-way in that portion of the post protruding from the stuffing box, fix the quadrant on it and alter the chain leads to suit. If the break occur in the rudder trunk, we should be forced to disconnect the upper portion of the rudder post and attempt to scarf or weld the two portions together. Rudders and temporary rudder posts have been made out of pieces of angle iron and wood with some considerable amount of success.

Assuming that we have no rudder at all, it is possible to steer the vessel by means of a long rope which is towed astern, the rope having a float fitted to its after extremity, and from this guide lines are led to the hawse pipes on port and starboard quarter and thence to winches. A lifeboat full of water raised or lowered on each side as occasion may require has the same effect.

NO NEW CONTRACTS LET.

NOT a single contract has been let by the Railways and Canals Department since the war began. Every effort is being made, however, as is also the case with the Department of Public Works, to carry on work already started.

Operations have been continued without cessation on the Welland Canal, the Hudson Bay Railway, the work at Port Nelson and the Halifax harbor scheme. Provided that money conditions remain reasonably easy, this work will be prosecuted steadily throughout the war, but nothing new will be undertaken.

The Georgian Bay Canal Investigating Commission, it is understood, has practically ceased work. There is no doubt that this great proposed public work will be held in abeyance on account of the war with its large military and naval expenditures requiring to be financed in addition to the unavoidable expenditures of internal government. The commission will continue in existence, although its work will experience a temporary cessation.

Oxy-Acetylene Process of Autogenous Welding

The subject matter of this article is taken from a paper read recently before the Institution of Naval Architects and from part of the discussion which followed. In view of the growing prominence of autogenous welding, considerable value attaches to the various observations.

THE oxy-acetylene process of autogenous welding which has been largely employed of late years, owing to the comparative simplicity and the facility with which it can be carried out, has a very wide field of usefulness. The oxy-acetylene blowpipe gives a flame producing a clean and easily controlled heat, which can be adapted to almost any position. The extreme adaptability of the process has tempted many to apply it without due regard to the whole of the conditions obtaining in practice, with the inevitable result that many cases of failure have occurred.

Weld Failures.

Several accounts of failures of boilers, valves, etc., repaired by oxy-acetylene welding have been published. The failures of boilers which have been published are not confined to cases of plates cracked in service and subsequently repaired by autogenous welding, the welded part having in turn given way, but cases of the seams of fire-boxes, and of the connection of crown plates to the cylindrical portion made by flame welding methods giving way, sometimes with disastrous results, have been recorded. In some of these cases, the welds were clearly defective owing to the presence of oxides, on account of an excessive proportion of oxygen having been present in the welding flame, or to the use of fluxes in insufficient amount, or of an unsuitable nature. In other cases, the welds have been imperfect and spongy, owing to the presence of gas cavities, or of particles of slag included within the metals.

In view of the fact that the welds which have failed, and of which particulars have been published, all appear to have been made by experienced operators, it is not surprising that in many quarters the oxy-acetylene and other hot flame autogenous welding processes are considered unreliable and viewed with suspicion.

Restrictions Enforced.

The Marine Department of the British Board of Trade have made rules and regulations fixing the limits to the use of such processes in boiler work, while the Government of Belgium has forbidden the use of autogenous welding in boiler construction, and in the case of extensive repairs. These restrictions, however, will probably be relaxed in the future, as the conditions affecting the strength and other qualities of the welded portion, in comparison with the original metal, become more thoroughly understood, and experience is gained of the behaviour of welded material under various practical working conditions. The writers consider that until results of such experience are available due caution should be exercised in the use of autogenous welding for boiler and high pressure work. As far as ascertained, the published results of investigations into the quality of welds made by fusion methods have, with one exception, dealt only with the changes brought about in the structure of the material, changes in the static tensile strength, and examinations for unsoundness and oxidation.

The authors, as the result of an extended experience in the testing of steel and other metals, fully realize that although the results of static tension tests frequently indicate that the weld is almost as strong as the unwelded material, they may be quite at variance with the results of dynamic tests or the behaviour of the material in practice. Working conditions are usually such that the material is liable to repeated shocks, and in the course of their examinations, the authors made a large number of tests in order to compare the behaviour of the welded and unwelded material under repeated impact, and also to compare the results of such tests with the static tensile tests. A large number of welds of mild steel were prepared, and submitted to static tension and repeated impact tests, in the ordinary condition, and also after various treatments. The first series of tests were made on round bars of mild steel, containing approximately 0.25 per cent. carbon, five-eights of an inch diameter.

Results of Tests.

The tensile test bars were turned parallel for 1½ in. and of ⅜ in. diameter, in order that fracture would take place in the weld. The elongation was measured on a 1 in. length, and it would appear from these results alone that an average weld might be expected to possess something like four-fifths of the strength of the unwelded steel, and that the ductility would be about one-fifth. The maximum strength in tension would appear not to vary to any great extent, but the ductility appears to vary considerably from the average, as the lowest strength recorded is practically 80 per cent. of the original material, and the lowest elongation only 9 per cent.

Hammering has increased the ductility

and reduced the strength slightly, while reheating after hammering has produced a further increase in ductility, and at the same time increased the maximum stress. Again, reheating to the same temperature, without previous hammering, has produced a somewhat large increase in the ductility and a further small increase in strength; whilst in the case of the specimens quenched in water and then reheated, the strength has risen to almost that of the unwelded material, although the elongation has been reduced.

Ductility of Weld.

It appears from these results, and others which the authors have obtained, that under no circumstances does the ductility of the weld approach that of the unwelded portion.

A number of welded bars of the same material, tested under repeated impact, were prepared 6¼ ins. long and notched in the centre of the welded portion, the diameter at the bottom of the notch being four-tenths of an inch. The results of eighteen tests of welds after various treatments indicate that an average weld might be expected to withstand about half as much as similar material unwelded. Hammering has apparently been the most effective treatment so far as increasing the fatigue-resisting properties of the material, but it must be borne in mind that the heating during the welding is extremely local, and consequently the metal in the immediate vicinity of the weld is liable to be at a comparatively low temperature, and there is a danger, when hammering, of vibrating a portion of the metal when it is at a black heat, which, as is well known, is productive of brittleness. If hammering is resorted to, the metal should be reheated to a full red heat (800 deg. Cent.) in order to remove strains or brittleness which might be set up during the process. Reheating or annealing also appears to be of little value, so far as increasing the fatigue resistance of the welded portion is concerned.

Comparison of Results.

Comparing results, it is of interest to note that the form of treatment which gave the highest strength in tension has given the lowest result in the impact tests. The results given were obtained upon test through the centre of the weld and not in the weld itself. This is due to the fact that in heating to fusion the ends of the pieces to be joined, the neighboring metal becomes heated to a temperature sufficient to make it brittle. The actual weld where fusion has taken place has a structure characteristic of cast metal. The portion immediately adjacent to the weld exhibits a coarse meshwork of overheated, brittle metal.

The results of the repeated impact tests show very clearly that the thicker the plate the less reliable is the weld, and the greater the reduction in strength. Thick material also generally shows less improvement by annealing; in fact, under ordinary working conditions, it is usually impracticable to anneal the material. In consequence of the highly local heating action of acetylene, there is considerable danger of contraction stresses being set up in the metal, and undoubtedly this contributes to the greater reduction in strength of thick material.

The case of a welded plate only one-eighth inch thick came under the authors' notice some time ago. It was sent them to examine and report upon, with regard to the relative strength of the welded and unwelded material, by a firm of tank makers who had recently introduced acetylene welding of the seams instead of lapping and riveting. Transverse bending and tensile tests showed that the joint was stronger than the neighboring metal. The material being too thin to obtain ordinary fatigue test pieces, narrow strips were cut about half an inch wide, some with the joint running transversely, and some with the joint running longitudinally to the strip. The strips were placed in a vise and bent backwards and forwards through 90 degrees until fractured. It was found that the welded strips required at least as many right angle bends as similar strips of unwelded metal to produce fracture.

Unequal Cooling Effects.

The metal being thin, was quickly heated locally to fusion without damaging the neighboring metal, and cooling being rapid, the material in the neighborhood of the joint was probably in a much tougher condition than before the operation. The danger of stresses due to unequal cooling being set up would also be reduced to a minimum in such material. As the thickness of the plate increases, a larger portion of the neighboring metal becomes overheated, the cooling is slower, and the danger of contraction stresses being set up increases.

The authors, as the result of a large number of tests and experiments upon autogenous welds, conclude that, although there is a wide field of usefulness for oxy-acetylene and similar processes for joining or repairing steel plates, bars, etc., which are not required to resist very severe stresses, considerable caution must be exercised, and due regard paid to all the conditions before making use of them. A very serious responsibility attends the use of autogenous welding in cases where the parts are likely to be subjected to considerable mechanical strain. In any case, where failure tended to endanger life and limb, welds, if not entirely prohibited, should be accepted with extreme caution. Autogenous welds always represent a somewhat uncertain quantity, as there is no means, except by destructive tests, of ascertaining whether a weld is good or bad.

Uncertainty of Autogenous Welds.

Mr. J. T. Milton gave some very interesting and valuable experiences regarding the welding that was passed by Lloyd's Register. He said he gave his cordial approval to the fact that the Marine Department of the Board of Trade had made rules and regulations fixing the limits to the use of such processes in boiler work; and that the Government of Belgium had forbidden the use of autogenous welding in boiler construction, and in the case of extensive repairs. Autogenous welds represented an uncertain quantity, and there was a serious responsibility attending them, which called for the greatest caution in their use.

After a very big experience with welds, Lloyd's Register had adopted that policy. Great pressure had been put upon them to accept repairs by autogenous welding, but they had not seen their way to accept them in cases where their failure would mean serious disaster. On the other hand, where failure would not involve disaster they had accepted hundreds of those repairs, and they had proved quite satisfactory. For the repair of shell plates and boilers of ships they would continue to prohibit that method, just as they did for crank shafts and large and important forgings.

It was necessary, too, to be warned that there was always a certain amount of unreliability about autogenous welding.

While the experiments referred to in the above paper were made on small pieces, the results might be very different if they were made with repairs on long lengths of plating, where they could not get entire uniformity of stress across the structure. He felt certain that if the same experiments were carried out on a larger scale they would show less advantageously than on the small scale. Only a little time ago a vessel had to be repaired after smashing her stern frame in a collision, and the work was done by autogenous welding. On account of the element of doubt, however, the owners had the ship taken into dock and a new stern frame was fitted. Unfortunately those interested in autogenous welding would not accept the offer then made by Lloyd's to test that piece of repair work.

Captain F. Symons, Deputy Harbor Master of the Port of Montreal, has been appointed to His Majesty's Ship Sappho of the active Cruiser Squadron in the North Sea.

GREAT LAKES AND ST. LAWRENCE

Water Transportation From the Atlantic to the Heart of Canada is one of the Live Issues of our Time and is Daily Becoming of Increased Importance

CLASSIFICATION OF GREAT LAKES STEAMERS.

IN November last a heavy gale swept over the Canadian Great Lakes which caused extensive damage to shipping, many large steamers being lost with the whole of their crews. Naturally the disaster to these vessels turned the attention of underwriters to their construction and classification, and it has been suggested that the requirements of Lloyd's Register should be adopted more extensively in the construction of that class of vessel, as it is maintained that the rules of Lloyd's for lake steamers were formulated after a careful investigation of the conditions under which they are usually employed, and it is believed that if they were more generally observed the disasters would not occur on such a large scale again. In reply to the views set forth above, Jas. M. Smith, late manager of the Collingwood Shipbuilding Co., of Collingwood, Ont., has written as follows:—

Canadian Shipbuilder's Views.

"It is quite true that many of the ships built in the American shipyards on the Great Lakes are not built as strongly as Lloyd's requirements call for, and most of the latter are classed in the Great Lakes Register, which is an offspring of Bureau Veritas, which might be termed French Lloyd's. We have found that the requirements of the Great Lakes Register are very complete, and the given dimensions of materials are very intelligently worked out. Ships built to class in this register are quite up to any requirements of British Lloyd's. There are some ships built to Lloyd's; they are good ships, but they are not any better nor any stronger than the ships that are classed in the Great Lakes Register. It would be much better for the shipowner if all ships were built equal to the requirements of some good classification society. I believe it is true that some of the ships that were lost may not have been built quite up to the requirements of such classification societies, but the majority of them were good ships. Some of the older ships may have been lacking in longitudinal strength, but I think that most of the ships that have been built on the lakes in recent years are quite strong enough for the requirements of the service.

"The steamer Wexford, which was lost off Goderich, was built to class in Lloyd's Register, and although she was an old ship, she had been repaired and rebuilt until she was a good sound ship I believe that the Regina, which was lost at the same time, was built to class in the British Corporation. The James Carruthers, which was lost somewhere above Goderich, was built to the highest classification of the Great Lakes Register, and was, without doubt, the strongest built freight ship on the Great Lakes. It was not want of strength that caused any of these three ships to founder. They were all fitted with good machinery, and had plenty of power, but no doubt they met a condition out on Lake Huron that could not be compared with ordinary heavy gales; possibly they encountered something of the nature of a cyclone sweeping down the center of the lake.

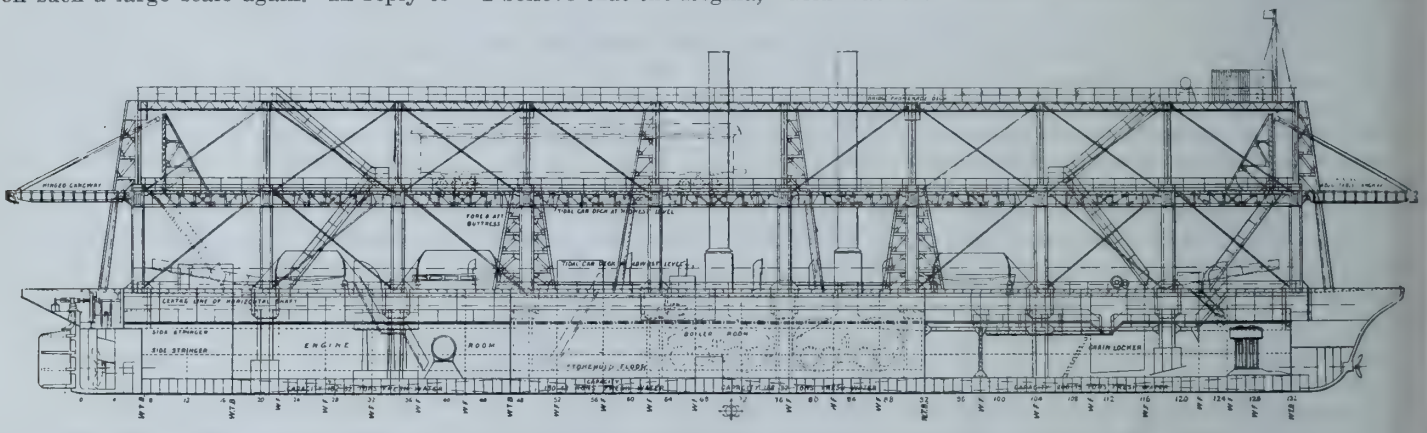
Distinct Type of Ship.

"The shipping trade on the Great Lakes has developed a distinct type of ship where large cargoes are carried on a moderate draft of water. The ships are built for a moderate price and are operated at a moderate cost. They are very suitable for the trade, but no doubt many little improvements will be added to them from time to time.

Carelessness Non-Contributory.

"I do not think that the ships which foundered in the storm last November were lost through carelessness on the part of the owners, or on the part of the officers or crews. My own belief is that they encountered an unusual storm, and the high winds, combined with an extremely violent snowstorm and zero weather, made a combination that was almost impossible to contend with. I think all of those ships would have reached port of safety if they could have turned around and run before the gale, but unfortunately Lake Huron narrows down to about a quarter of a mile where it enters the St. Clair River at Port Huron, and the waters are shoal for a good many miles before entering the river. The masters knowing this would not dare to run for the river, and no doubt they turned to fight it out. Possibly the ships were thrown in the trough of the sea, and if so they would have little chance of recovery.

"We have built over 40 vessels at Collingwood during the past 12 years, and they were all built equal to Lloyd's requirements. The most of them have been for service on the Great Lakes, and a few for service on the sea coast."



PROFILE OF NATIONAL TRANSCONTINENTAL RAILWAY CAR FEERY "LEONARD."
This vessel was described in the August issue of our Journal.

LOCK GATE LIFTER FOR TRENT CANAL.

THE accompanying illustrations show the steel pontoon lock gate lifter recently built for the Canadian Department of Railways and Canals, for service on the Trent Canal, Province of Ontario, by M. Beatty & Sons, Ltd., Welland, Ont.

It was designed and built to lift and place into position the lock gates, and its capacity of 50 tons and clearance of 37 feet above deck will enable it to step any of the mitred gates throughout the entire length of the Trent Canal. The general design comprises a structural steel collapsible derrick mounted on a steel pontoon, with separate steam engines for each operation.

PONTOON GATE LIFTER WITH DERRICK TOP LOWERED FOR PASSING UNDERNEATH BRIDGES.

The pontoon supporting the derrick is made of steel plating with extra strong steel frame work, there being two longitudinal and three transverse trusses, so as to provide for the severe loads it will have to bear. The hull is constructed with rounded bilges, and each end has a rake of 45 degrees. The length over all is 55 feet, the beam 27½ feet, and depth 9 feet.

The derrick is built of structural steel in two units. When in working position, the derrick is erect, and in transporting the lifter from one lock to another, the upper part of derrick is lowered where necessary, which allows of its passage under overhead bridges along the canal. The operation of raising and lowering the derrick is performed by a 6 in. by 6 in. double cylinder engine mounted on one of the back legs. Two swivel hook padlocks are suspended, one from each overhanging top of front legs of derrick, each carrying eight parts of ⅞ inch steel cable. The main engine has 9 in. by 9 in. double cylinders, double drums and is link reversing. The operating levers are brought to one location for the convenience of the engineer.

The pontoon is kept on an even keel by two movable ballast cars under deck. Each car is moved by a steel screw operated by an independent 6 in. by 6 in. reversing engine. These engines are controlled by pendulum governors, automatically shifting the ballast to the proper position to put the pontoon on an even keel, whether it is under load or light, with the derrick upright or folded. In addition to the automatic control, the ballast car engines can be operated from the engine room above deck. Dial indicators are provided to show the position of the ballast cars at all times.

PONTOON GATE LIFTER RAISING GATE LEAF FROM WATER.

The outfit has stepped to date the gates for locks 1, 2, 3, 4, 5 and 6 of the Ontario-Rice Lake division of the Trent Canal, and in operation has met all expectations. The total time for stepping each leaf from the time of picking up in the water to releasing in gate recess varied from twenty to forty minutes, according as an upper or lower gate leaf was handled respectively. At lock 3, the lower gates are 37 feet high over timbers, and these represent the heaviest gates the lifter is designed to handle. A view is shown of the gate lifter in the operation of raising gate leaf from water.

WILL OIL REPLACE COAL AS FUEL?

THE world's production of crude petroleum in 1912 amounted to about 52,921,750 tons; the sources, respective quantities and percentages, were as follows:—

Country.	Net Tons.
United States	32,897,060
Russia	10,174,560
Mexico	2,910,000
Roumania	1,987,360
Dutch East Indies.....	1,672,000
Galacia	1,298,620
India	1,101,450
Canada	38,750
Other Countries	841,250

If the whole of this crude petroleum were employed as fuel in steam-raising it would not replace, allowing for its higher thermal efficiency, much more than 5½ per cent. of the world's output of coal, whilst if used in internal combustion engines it would be equivalent as a source of power, to about 16 per cent. of the coal. Only a small proportion, however, of the crude petroleum can be regarded as available for use as a source of power, for by far the larger part is in demand as an illuminating agent and as a lubricant for machinery.

It is not probable that there can be any general substitution of petroleum for coal as a source of power, although there is undoubtedly opportunity for making provosion for a large use of liquid fuel for certain purposes in which its advantages are conspicuous.

OVERHAULING A DAMAGED THRUST BEARING.

IN a recent number of the Journal of the American Society of Naval Engineers there appeared the following paper covering the **Overhaul of a Damaged Thrust Bearing**, by Lieut.-Commander H. C. Duigen, U.S.N.

In the four-shaft Parsons turbine installation where a h.p. and i.p. cruising turbine are employed, the two cruising turbines being on the inboard shafts, there is considerable excess propeller thrust on the l.p. thrust collars, whose shaft also carries the i.p. cruising turbine, when going up to speeds near the limit of this combination. Under these conditions, with the propeller thrust taken on the lower shaft rings, the l.p. thrusts of the shafts that carry the i.p. cruising turbine are quite susceptible to heating, and this thrust has been burned out on several vessels. There is usually sufficient surface in the l.p. thrust collars, and the thrust will operate quite satisfactorily provided a sufficient number of the collars bear and their surface is true.

On one vessel this thrust operated without trouble for a long period, until one day, when it was desired to speed up to 19 knots quickly, the thrust heated rapidly and could not be cooled till the combination was shifted so as to release the excess thrust and allow the rotor to move out. Previous to this, speeds as high as 20 knots had been run on this combination for long periods with thrust quite cool. In connection with this matter it has been noted that the rotor comes in harder, and there is considerably more propeller thrust when in shoal water. The worst condition for heating is therefore in speeding-up quickly on the i.p. combination in shoal water. When the vessel is by herself this condition can be avoided to some extent, but when in formation any speed called must be quickly given.

Revealing the Trouble.

On anchoring, the heated thrust was examined, and about six of the collars and rings were cut and roughened. The surfaces were cleaned and stoned; but as there were only a few hours available to do this work, a thorough job could not be made of it. On trying this thrust again on the i.p. combination, it again heated up at about 17 knots. During an overhaul week, a few days later, the thrust was carefully examined. The clearance on bottom rings and go-ahead side of collars was measured by feeler gauges, with shaft in position, at intervals of 90 deg. The readings conclusively showed that the surfaces of the collars did not run true. The heated collars also showed that the most intense heat was at one part of the circumference, and this was the same part of the circumference on all the collars. Squares and straight-edges placed on the surfaces of the collars also showed that the collars were far from being true, and that they were not parallel to each other or normal to the axis of the shaft.

Spotting the shaft collars with red lead and bringing the thrust wings up to bear, and then revolving the shaft also clearly showed that the collars ran out, and the collars that bore touched only in spots on one side. The flange of the thrust shaft was trained to see whether the shaft ran out. The differences for different points of the circumference were so slight that it was apparent that the shaft itself was not bent. From the measurements taken it appeared that the surfaces of collars had not been machined true, but that there had been sufficient bearing surface to allow the thrust to run cool till, on account of some special circumstances, due perhaps to speeding-up quickly, an excessive load was produced and the heating resulted.

Remedying the Trouble.

To remedy the defective conditions, the following procedure was adopted:— The lower thrust-block shell carrying the rings taking the go-ahead propeller thrust was carefully cleaned up and put in place. The surface of the collars was carefully covered with red lead, the thrust brought up to touch, and then the shaft revolved. The first spotting showed number 6 collar to bear hard in two spots, and about five other collars bearing slightly in streaks for about 40 deg. on one side. The spots were then filed and the spotting process repeated. The second spotting showed about eight collars bearing in streaks part of the way around. The third spotting showed about ten collars bearing in rather heavy streaks about half-way around. Filing was then stopped, as it was feared to take off too much metal, and time was also limited.

Grinding-in Process Adopted.

A novel grinding-in process was then tried. The lower thrust block was put in place. A dummy adjustment jig which permits of rotors being moved in or out with a ratchet gear was rigged over the thrust collars to keep rotor in place. A mixture of bathbrick and oil was put on the thrust bearing and the turbine rotated at about 25 revs. with steam. The collars were brought to bear by means of the jig, and were moved up slightly tighter as the grinding proceeded. The supply of powdered bathbrick and oil was continually replenished while the grinding was going on. The brickdust and oil ground the surfaces in contact and tended to smooth them up. As the collars are of hard steel and the thrust rings of composition, most of the grinding would be done on the rings, however, some grinding and smoothing-up of steel surfaces would also result. This grinding was continued for about 2½ hours. The thrust block was then taken out and all parts of rings and collars carefully cleaned and replaced. After these adjustments were made, the thrust, though regarded with suspicion, ran satisfactorily up to nearly 18 knots on the combination for nearly three months, but on another occasion when necessary to speed up quickly in shoal water, it again heated badly.

The vessel arrived at the navy yard shortly after for a two weeks stay, and thus an opportunity for more carefully overhauling the thrust presented itself. The shell containing the rings was taken to the shop, and the edges of countersinks and all oil grooves were carefully milled out and the surfaces carefully smoothed up. The surfaces of collars were carefully dressed up with file and scrapers by two navy yard mechanics especially expert at this work. Then the process of spotting the collars with red lead and filing down high spots was repeated, but this was done more often than on first attempt. The work took two machinists six days.

When this spotting and filing had progressed so far that a fair bearing was obtained on most of the collars, and all the collars touched at some points, the surfaces were again ground in a bath of oil and brickdust for about three hours, running the turbine with steam at about 30 revs. per min. Everything was again carefully cleaned out. The process of cleaning out, spotting, and filing, and finally grinding-in, ensured surfaces being smooth. When the thrust was tried soon after this to the practical limit of the I.P. combination, it operated satisfactorily. This method of grinding-in a bearing is perhaps somewhat novel, but it appears to be quite effective, and accomplishes what might otherwise require a large amount of labor.

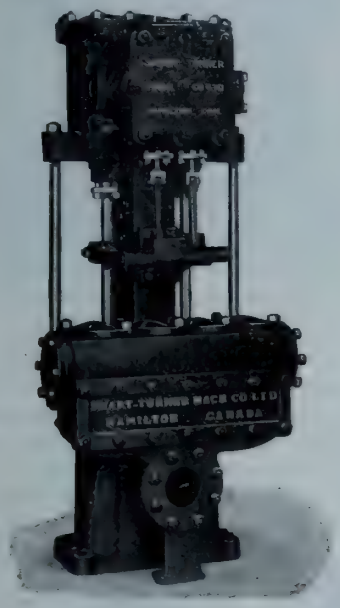
Empress of Ireland Salvage. — The Canadian Salvage Association report that their divers have succeeded in salving all the silver bullion from the submerged wreck of the Empress of Ireland, off Father Point. In addition to this the divers have brought to the surface all the mails from the vessel, including a large quantity of registered mail. Much of this mail matter had been badly damaged by its long immersion, but a good deal of it will be dried and ultimately sent on to its destination. The mail sacks were sent on to the Post Office Department at Ottawa, where they will be looked after. Work by the divers on the hull of the Empress has now closed for the season, and it is not known whether any further efforts to get the contents of the hull out will be made next year, this depending upon the underwriters, to whom it was surrendered.

PROGRESS IN NEW EQUIPMENT

There is Here Provided in Compact Form a Monthly Compendium of Marine Engineering Product Achievements

VERTICAL DUPLEX PISTON PUMP.

THE cut herewith illustrates a vertical duplex piston pump, manufactured by the Smart-Turner Machine Co., Hamilton Ont. These pumps, being vertical, take up less space in the engine room and do away with the



VERTICAL DUPLEX PISTON PUMP.

tendency—which is present in horizontal pumps—to wear on the bottom side of the steam and water cylinders. This has a direct effect upon the life of the plunger.

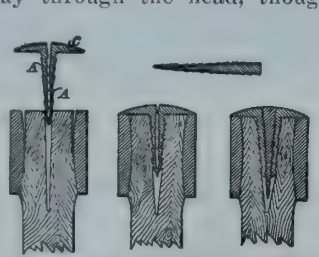
It will be seen that the suction and discharge valves are so placed that they are readily accessible, and that it is not necessary to open up the whole of the valve chamber to examine or repair any particular valve. These pumps are suitable for either stationary or marine service.

EXPANDING WEDGE FOR HAMMER HEADS, ETC.

NOT the least of the many little annoyances the engineer meets with in the course of his work is the loosening of hammer-heads from their handles owing to the shrinkage of the wood. This is of frequent occurrence in spite of the rather makeshift methods usually adopted to prevent it, and is often the cause of rather serious accidents. Attention is therefore called to a patented expanding wedge for the purpose of fixing the heads of hammers, axes and other similar tools. The inventor claims that the heads are thereby fixed with absolute security, so that the time wasted in tightening them up while work is in progress is saved, and the possibility of accidents arising from the heads flying off and injuring persons or property is eliminated.

The accompanying illustration, which is more or less self-explanatory, shows the design of the wedge and the method of applying it to fix a hammer-head. The device will be seen to consist of a pair of tapered side-plates lettered A in Fig. 1, pinned together at their thin ends for convenience in fixing, and a central wedge, Fig. 2, the object of which is to expand the side plates. The inner and outer faces of the side plates, and the two faces of the wedge, are serrated, as shown, so that slipping of any part is prevented.

To apply the device, a saw-cut a little deeper than the thickness of the head is first made in the end of the handle, as shown in Fig. 1. The head having been placed in position on the handle, the side plates are driven into the saw cut so that the projecting flanges are flush with the end of the handle and the head, as shown in Fig. 3. The central wedge is then driven in between the side plates into the position shown in Fig. 4. This operation bursts or shears the pin connection between the side plates, and forces them apart, so that the wood is expanded sufficiently to fill the hole in the head completely; the latter is therefore quite immovable. If, after a time, any further shrinkage of the wood should occur, it can be taken up quite easily by driving the central wedge down another notch, and this operation can be repeated several times if necessary. In this way the wedge might be driven half-way through the head, though the



FIGS. 1, 2, 3, 4. EXPANDING WEDGE FOR HAMMER HEADS, ETC.

amount of shrinkage thus taken up would be greater than is ever likely to occur in practice.

These wedges are made by the Patent Expanding Wedge Co., 114 Great Portland street, London, W., in fourteen different sizes, of which the smallest measures 15-32 in. by 7/8 in., and is suitable for a head weighing 1/2 lb.; the largest size measures 1 3/8 in. by 2 1/2 in., and can be used for heads up to 14 lbs. in weight. They are very inexpensive, and their use would often save the cost of fitting new handles.

MARINE AUXILIARY EQUIPMENT OF CANADIAN MANUFACTURE.

A new and interesting development following the growth of Canadian shipbuilding is the establishment of manufacturing plants for marine auxiliaries. Needless to remark, it is quite important for the makers of auxiliaries to be in close touch with the shipyards and vessel owners in order that the most suitable style of equipment may be offered for each vessel and spare parts furnished at short notice.

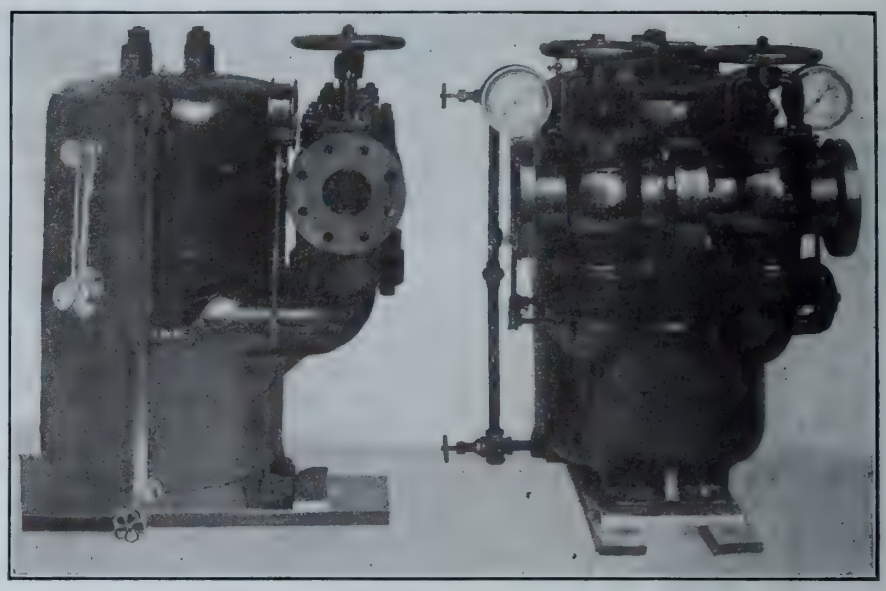
The Canadian Griscom-Russell Co. has been manufacturing for some time in their shops in Montreal the complete Reilly line of marine specialties such as feed water heaters, salt water evaporators, filters and grease extractors, along exactly similar lines to those by the Griscom-Russell Co., New York. One of their recent contracts was for two No. 47 Reilly multicoil feed water heaters with by-pass for installation on the dredges of the Canadian Stewart Co., operating in connection with the Toronto Harbor Improvement. The accompanying illustrations show the size and construction of these heaters. The heating surface consists of 47 coils of seamless copper tubing rolled into coils of small diameter. These coils are connected to the top and bottom manifolds with copper to copper unions which require no packing and allow easy removal of any coil. The large door in the heaters gives ready access to heating surface for inspection. These heaters are undoubtedly the largest marine feed water heaters ever built in Canada.

A high temperature of feed water is secured by the water passing through the coils whose small radius breaks up the column of water and thereby increases the efficiency of the heating surface. A number of these heaters of smaller sizes have already been built to Government and private order.

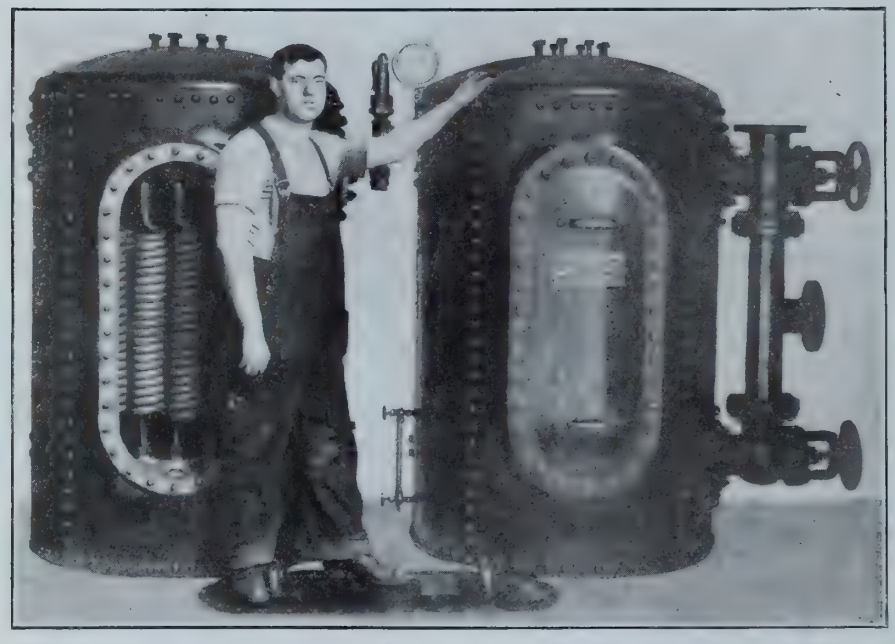
The Canadian Stewart dredges are also equipped with two 4-in. Reilly multiscreen feed water filters and grease extractors, their general construction being shown in the illustration. The filtering surface consists of heavy Terry cloth, being something in the nature of thick Turkish towelling. On large dredge work, it

is especially desirable to have an efficient filter so that the boiler feed water be free from sand and other impurities stirred up in the surrounding water by the action of the dredge, and as surface condensers are usually installed on large dredges it is important to have an efficient grease extractor to remove oil and grease from the water in the hot well before feeding the condensate to the boiler.

An essential part of any filter is accessibility to the filtering medium and simplicity in cleaning. This cleaning is accomplished in the Reilly filter by a large bottom blow-off for the heavy precipitate and surface blow-off for oil and grease. An internal steam cleaning connection is provided so that the filter may be by-passed and the filtering surface boiled out without removing the cartridges. When it is desired to remove the cartridges, they are readily withdrawn through a large manhole in the top of the shell and may be boiled in soda for a thorough cleaning of the filter material. These filters are usually built for high pressure service, being placed between the feed pump and the boiler. In some cases, however, they are designed so that the water is cleaned of sand before passing through the feed pump.



TWO 4-IN. REILLY MULTI-SCREEN FEED WATER FILTERS AND GREASE EXTRACTORS.



TWO NO. 47 STANDARD REILLY MARINE FEED WATER HEATERS WITH BY-PASS VALVES.

LLOYD'S REGISTER OF SHIPPING.

THE 1914 edition of that invaluable shipping Annual, Lloyd's Register of Shipping, has recently been published. The book contains shipping statistics of great value and interest. One of the tables is particularly pertinent to the discussions which have been going on in this country of late as regards the inspection and classification of shipping. This table shows the number and tonnage of vessels classed by each of the classification Societies of the World, and figures of this kind would scarcely be published by an institution had it not an unquestioned lead of its rivals. We are, therefore, not surprised to find that, while 9,648 steamers are classed in Lloyd's Register Book, no other institution classes more than 2,833, while all the others come still further in the rear, the American Bureau having only 303. The disparity is particularly marked in the cases of steamers of large tonnage. The total tonnage classed by Lloyd's Register at the present time, including sailing vessels, approaches 24,000,000 tons, some 45% of which is owned outside the United Kingdom.

This is undoubtedly a remarkable international position for Lloyd's Register to have attained, and it raises the question—a very practical and urgent one for our shipping community—of the conditions and methods which are precedent to such world-wide recognition. No doubt very many causes have contributed to the success of Lloyd's Register of Shipping in crossing all national frontiers. Its constitution—providing for the equal share in its government of all sections of the shipping community—its long history, and its able officials have all helped to bring about this achievement. Success has led to further success, as in the case in all progressive business, and has provided the means whereby alone a great Classification Society can keep in the fore front in these days of big things. There are, however, two points which we think it worth while to emphasize, from our own knowledge of the Society's practice, as important factors in the generation of the confidence which Lloyd's Register everywhere commands. Both these considerations converge on the great fact of the absolute independence of the surveying staff of Lloyd's Register. They are different aspects of the same thing.

First, Lloyd's Register relies entirely upon the services of men who are in its exclusive employment and are not allowed to undertake private business. These competent and experienced officials are paid adequate salaries during active life and are eligible for liberal pensions upon retirement. Consequently, the service of Lloyd's Register provides them with a career which would be irrevoc-

ably marred and broken by any failure from the high standard of duty required by the Society.

The other point to which we think it well to direct attention is that the surveyors to Lloyd's Register are not permitted to have any pecuniary or other interest direct or indirect in any business or industry which could affect or even appear to be liable to affect their perfect impartiality.

The activity of naval architects is always producing fresh designs for economical construction, greater deadweight capacity on a given draft, improved machinery and boilers, and so on., Every such proposal is sure of a fair, unbiased consideration from Lloyd's Register, for no one in its service is influenced by any consideration as to the effect the Society's decision will have on his own pecuniary position. The only thing the staff has to consider is its professional reputation, and there is no inducement for it to depart from the path of justice, as indicated by the best scientific knowledge and experience. It is worth while in our judgment for our legislators and the leaders of our shipping community to consider these matters, for no Classification Institution can stand in this time of progress which is not able to provide adequately for the fulfilment of these conditions.

A VOYAGE OF DISCOVERY.
Being an artist's idea of what an eminent German gentleman saw during his recent visit to British shipbuilding yards.—*Journal of Commerce.*

MOTORS FOR NEWFOUNDLAND FISHERMEN.

CANADIAN firms in a position to supply motor engines and motor fuel will find a valuable market is Newfoundland. The fishing fleet within the past two years has been installing motors in its boats, with the result that not only is there a brisk demand for engines but there is also a steadily increasing consumption of gasoline. Last year, according to statistical returns, motor engines valued at $140,000 were imported into the colony, and this year it is estimated that imports will approximate $500,000. The representatives of two United States concerns have spent the entire summer in and around St. Johns, and up to the end of July they had been able to place 275 orders. Engines of five, seven and nine horse-power composed the bulk of these orders, but in some instances higher powered engines were purchased. The prices for the smaller powered engines ranged from $180 to $225. So far as could be learned, no Canadian firm is actively engaged in soliciting this market. A few years ago a Nova Scotia concern, now in liquidation, sold a considerable number of motors. The two United States companies referred to seem to have largely gained control of the market. The fact that there is a rebate on the duty for engines for fishermen's use provides a stimulus for this trade.

In the matter of motor fuel, Canadian firms should be at a great advantage. Oil from the United States sells at 50 cents a gallon which is only 4-5 of an Imperial gallon. Gasoline in Canada can be purchased at 25 cents per gallon. As indicative of the demand, one fisherman requested one of the motor engine representatives from the United States to secure for him 50 drums of gasoline as an initial order. Inquiries for supplies of oil are also constantly noted in St. Johns.

Canadian firms in a position to supply either engines or fuel would do well to investigate the conditions in Newfoundland, for while the market for engines may not be an expanding one, that for motor fuel will steadily increase, and with the advantage of price in favor of Canadian concerns, a profitable business might be built up. Oil for the use of fishermen is also subject to a rebate of duty.

TESTS FOR DECKED LIFEBOATS.

THE Marine Department of the Board of Trade recently issued the following instructions to surveyors on the question of decked lifeboats:—

Surveyors who are responsible for the survey of passenger steamers should note that all decked boats constructed before 1st March, 1914, should be tested afloat. To this end the surveyor should require that not less than one in every four of such boats should be put in the water at each survey of every passenger steamer on which they are carried. The boats to be tested should not be prepared for the tests by painting or puttying, etc., but the tests should be fairly representative of the ordinary condition of the boats on service.

The boats selected should be sounded before being put into the water to ascertain if there is any water inside, and if so the water should be removed as far as practicable. If any water is found in the boat or if there be any evidence of leakage through the deck it will be necessary to make the deck watertight before the boat is passed . This should be done by covering the whole of the deck, after removal of the foothold battens, with canvas of at least No. 3 quality laid in thick paint and well painted over after being secured with copper tacks properly spaced. At least one of these boats should be loaded with the full load of weights representing the occupants and equipment, and the remainder might be at first tested afloat without being loaded.

If the amount of water entering the boat is small, the boat may be passed after it has been well painted and the seams filled with good white lead putty, if the surveyor is personally satisfied. If a dangerous amount of water comes into the loaded boat after floating for, say, three hours, the boat should not be passed until satisfactory alterations have been made to render the boat perfectly safe. The surveyor should not allow the boat to be made tight by means of caulking or paint, but should refuse to pass the boat until it has been provided with efficient air cases of sufficient capacity to secure the buoyancy and stability of the boat.

Accommodation.

The air cases should be fitted in as large units as practicable, and it is important that the whole of the available space under the deck should be occupied by them in order to avoid a serious reduction in the number of persons to be allowed. The number of persons for which the boat will be certified after the fitting of the air cases, which must be inspected and measured by the surveyor before they are put into the boat, is to be regulated by the total capacity of the air cases, allowing three cubic feet of air case for each person, subject to the further condition that the freeboard of the loaded boat is not less than that allowed by tne rules in force when the boat was built with the addition thereto of any correction that may have been made for camber or round of beam under those rules. No greater number of persons can be allowed than the boat was formerly accepted for, and the hull must be made perfectly watertight before the boat is again accepted as part of the life-saving equipment of the ship. If the unloaded boats under test should be found to have any leakage at all after floating for at least three hours, they should be loaded tested and treated as described above. If, however, the unloaded boats are found to be perfectly watertight they may be passed if the surveyor is satisfied. A record of all such tests should be made in the docking book, and the result of the tests, when completed, should be reported to the Principal Ship Surveyor on the form Decked Lifeboats, Surveys 149.

The surveyor should carefully inspect all the other decked boats on board the vessel, and if he has any reason to doubt the efficiency of any of the boats not tested, he should take such steps as appear to him necessary after testing to render all the boats safe for the intended voyage. The remaining boats not tested afloat should be dealt with in turn at as early a date as possible, and in any vessel equipped with decked lifeboats the whole of them should be tested afloat before 1st March, 1915, provided, however, that if after satisfactory testing any one boat, the surveyor is satisfied that further tests of boats of precisely similar construction on any vessel are unnecessary, he should apply to the Principal Ship Surveyor for instructions as to whether further tests may be dispensed with.

Canvas Topsides.

Surveyors should note that the efficiency of decked boats depends on the topsides or bulwarks being watertight and of sufficient strength. Cases have occurred in which the canvas bulwark has torn away its connection to the hull of the boat, and the canvas should be carefully inspected for signs of decay and tested as may be practicable. No boat should be passed in which the topsides are not watertight, and when it is found necessary to renew the canvas, it is desirable that it should be No. 1 hurricane canvas proofed, doubled at the lower part, and well fastened to the hull with copper nails closely spaced.

Freeing the Deck of Water.

Decked boats which have not been inspected and approved by the Board before the 17th January, 1913, must be fitted with efficient means for clearing the deck of water. Decked boats having a well in the middle of the deck have been provided with scuppers through the bottom fitted with non-return valves, and the surveyor should see that the valves are in working order.

Flush deck boats have in general been fitted with canvas sleeve ports and, in the case of boats not provided with some efficient means of clearing water from the deck, such ports should be fitted as soon as practicable. A drawing showing a suitable arrangeemnt of sleeve ports will be forwarded to the Surveyor from the Consultative Branch on application.

A few decked boats have been constructed having freeing ports in the canvas topsides, provided with a canvas flap. Such ports are very objectionable, not being watertight, and should be closed watertight by canvas covering pieces, double sewn, and the freeing arrangements dealth with in accordance with the foregoing. In a few cases freeing ports with wood hinged shutters have been fitted ;the surveyors should as opportunity offers test such ports for practical watertightness by heeling or rocking the boat, and should report whether they are efficient or otherwise.

Decked boats which had been inspected and approved before the 17th January, 1913, may be accepted for the present without any arrangements for clearing the deck of water, provided the canvas topsides are in good condition and watertight.

SHIPOWNERS AND INSURANCE RISKS

THE Canadian Government have been in communication with the Imperial authorities with respect to the measures taken for the safeguarding and insurance of merchant shipping under the British flag. It is learned that difficulties have arisen between shippers and shipowners in consequence of the wish of the latter to insert in bills of lading a clause to cover obligations, which they undertake as to any voyages under the war risks insurance scheme, to call at a port in the United Kingdom for information, instruction or advice from the Admiralty or some other department of the Government before proceeding on the final stage of the voyage. The following is the text of such a clause:—

"If, and so long as the ship is insured against war risks with a War Risks Insurance Association, under or in connection with a war risks insurance scheme from his Majesty's Government, the ship, in addition to any liberties expressed or implied in this bill of lading, shall have the liberty to comply with any orders or directions as to the departure, arrival, routes, ports of call, stoppages or otherwise, howsoever given by his Majesty's Government, or any department thereof, or any person acting or purporting to act with the authority of his Majesty or his Majesty's Government or any department thereof, or by any committee or person having under the terms of the war risks insurance on the ship the right to give such orders or directions, and nothing done or not done by reason of any such orders or directions, shall be deemed a deviation."

It must be apparent that the requirement is for the security of the cargo equally with the ship, and that it is not to the prejudice of the shippers' interests. The Government desire that shippers should take particular notice of this explanation; and as their interests are safeguarded, and not sacrificed by such a clause, it is hoped that there will be no further objection to its insertion.

Detroit, Mich.—President Livingstone of the Lake Carriers' Association has sent out an order to captains of steamers enrolled in the Association to observe more rigidly the request to navigate in a definite inside course while westbound, in order to avoid the danger of collision in fog or thick weather. "Complaints continue to be received that certain vessels are not observing the rules applying to these courses," says President Livingstone. "This rule was adopted by the association last spring, and every master is expected to observe it to the letter, in smooth, clear or thick weather."

Panama Canal's First Stowaway.—Bearing the distinction of being the first stowaway successfully to have negotiated the Panama Canal, John Jaughan arrived in San Francisco on the new Admiral Line steamship Admiral Schley. After his presence was discovered, Jaughan was signed on as member of the crew, and was employed polishing brasswork, for which he will receive one cent.

St. Lawrence Channel.—The St. Lawrence channel will by the end of the present autumn have been deepened to a uniform depth of thirty-five feet through the whole of Lake St. Peter, except for a distance of two and a half miles.

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Vol. IV SEPTEMBER, 1914 No. 9

PRINCIPAL CONTENTS.

YOUR COUNTRY'S CALL.

NO apology is needed at this juncture for our drawing attention in the columns of this journal to the fact that the Dominion of Canada has issued a call, now in effect and remaining so long as the Empire to which we belong has need, for men. What are we doing about it? Indisputably we are loyal, yes, and the evidences of loyalty have been so satisfactory as to be unquestionably permanent; while the responses expressive of our substance have met the meantime need; but the call for men—you and I, has only been in part met.

The appeal for the military and naval services of Canada's manhood is unique, both on account of the issues involved and of its fortunate rareness; the response should therefore be all the more hearty. Do we realize sufficiently, and do we read into the dispatches from the front, naval and military, that citizens of the British Empire like ourselves are maintaining a ceaseless vigil aboard our war vessels and are lying in the trenches holding back a powerful enemy, and one whose aim is to snuff all of us out completely. At the desk, in the store, on the street, at the bench, in the factory, and from our shipping, 100,000 men can easily be spared, and at the front there will easily be found room for them.

Don't leave it to little Belgium, France and the British Isles to roll up the enemy's attack, and don't wait till Russia gets up to the gates of Berlin, but be one of a Canadian host ready to stand shoulder to shoulder with all of them in their combination effort.

CANADIAN BUSINESS DISLOCATION.

NAVIGATION season 1914 in its every feature has been a disastrous one so far as Canadian shipping is concerned. To the European war, of course, must be attributed the disorganized ocean traffic to our shores, the curtailment and premature closing of the passenger and tourist service on our inland waters, and to some extent also the decreased movement of freight on the latter. The advent of the war, coming as it did when the wave of commercial depression had not fully spent itself, gave a renewed impetus and an added strength to that already destructive influence.

It is unfortunate, however, that we should allow ourselves individually and collectively to become so distracted by this war of nations, as to become oblivions to every other interest, personal and communal. Much has recently been written relative to the tendency on the part of employers of labor to sit tight and sip war news, and while the stirring-up which they have received has been intensely seasonable and productive of good, it cannot be denied that employees in their capacity as such, and in the opportunities at their disposal for rational enjoyment, have adopted a like and perhaps more aggravated attitude. The fact is that none of us have been or are attending to our business affairs as we should and, of necessity, where we call the tune we must pay the piper.

The panic with which our business interests were seized in the early days of last month has passed off, only to give place, however, to something more stunning and destructive still—the war fever. We seem to forget that the war in which we are involved has as its object the crushing-out of militarism among the nations of the world, and who shall deny that unless we take immediate steps to again put business on the pedestal, the present temper of our people will contribute to and establish a military regime in Canada, hitherto undreamed of, and in no sense desirable. We need not, of course, be too rashly optimistic, nor our faith in men and things be so unbounded, as to believe that wars are going to cease when peace is again declared in Europe. This Canada of ours, like every other nation, should be prepared to defend, as it will yet without a doubt have to, both her rights and her very existence, a contingency she is at the present time utterly incapable of doing but, while this is all true, her industrial feature must be safeguarded both in its continuity of application and its progressive development, for by so doing, and only so, will the best interests and welfare of our people be served.

Marine News From Every Source

Port Arthur, Ont.—A foghorn and plant will be erected at Battle Island, near Rossport, under the direction of John Egan, of Ottawa.

Sault Ste. Marie, Ont.—The British Construction Co. will build the dry dock here, and are in the market for machinery and machine shop equipment.

The Canadian Vickers, Ltd., Montreal, recently purchased a 600 ampere arc welding set from J. D. Lachapelle, Canadian sales manager of the C. & C. Electric & Mfg. Co.

Victoria, B. C.—Parks, Tupper & Kirkpatrick, who were the successful tenderers for the new marine wharf on the Songhees Reserve, have completed the contract and are now arranging for the removal of their plant.

Fort William, Ont.—The flagship Noronic, of the Northern Navigation Company, which has been running between Fort William, Duluth and Sarnia, made her last trip down the lakes on September 9. She will winter at Sarnia.

Campanello Steamships, Ltd., has been incorporated at Ottawa, Ont., with a capital of $100,000 to construct ships, tugs, etc., at Toronto, Ont.—Incorporators: S. P. Biggs, W. W. Evans, W. L. Pinkey and F. C. Allen, all of Toronto, Ont.

The Canadian Shipbuilding & Drydock Co., has been incorporated at Toronto, Ont., with a capital of $2,000,000, to construct docks, warehouses, etc., at Owen Sound, Ont. Incorporators: T. H. Bartib, C. B. Henderson and S. C. Stavely Kerr, all of Toronto.

The Lake Nipissing Shipping and Transportation Co., has been incorporated at Toronto, Ont., with a capital of $40,000, to build and operate ships, etc., at Toronto, Ont. Incorporators: B. H. L. Symmes, J. S. Duggan, T. S. H. Giles, W. C. H. Swinburne and A. Pomeroy, all of Toronto.

Quebec, Que.—The new steel ferry boat, which has been constructed by Geo. T. Davie Shipbuilding and Repairing Co., for Three Rivers, was launched from their yards at Levis recently. The vessel, which will be named Le Progres, is a trim and substantial craft, and a splendid example of the workmanship of the Davie firm.

Prince Rupert, B.C.—An enterprise, which will mean much to the industrial life of Prince Rupert, made its first important advance on August 28, when the first of a series of twelve pontoons of the big 20,000-ton floating dry dock of the Grand Trunk Dock and Ship Repair Co. was floated. The next pontoon will be launched this month.

Oakville, Ont.—Work has been started on the Government scheme of harbor improvement. A gang of men is employed repairing the pier by placing a new casing along the breakwater. The work costing $1,070, will be completed in about two weeks. For the whole length of the pier a ventilating scheme will be followed to allow the rapid drying of the water-soaked timbers.

The Siemens Co. of Canada, Ltd., Montreal, P.Q., has been awarded the contract by the Dominion Government for the supply of submarine cables—23 knots of single conductor submarine telegraph cable (107 lbs. copper and 150 lbs. gutta-percha per knot), with sheathing of 12 No. 8 S.W.G. iron wires, to be delivered at Halifax, N.S.; and 14 knots of the same to be delivered at Vancouver, B.C.

Quebec, Que.—When the boiler on the tug Alpha, of the Union Sand Co., exploded on Sept. 9, the boat went down in a few minutes, about two miles off the shore, at Montmorency Falls, and the two men who were in charge barely escaped drowning. They clung to a skiff and were only rescued after suffering intensely from cold and exposure. The tug lies under thirty feet of water, but is expected to be salvaged.

Collision Off Pacific Coast — Eleven lives were lost when the steel passenger steamship Admiral Sampson of the Pacific-Alaska Navigation Co., was rammed and sunk by the Canadian Pacific passenger steamship Princess Victoria off Point No-Point, twenty miles north of Seattle, at 6.30, on the morning of August 26, during a fog and thick smoke from forest fires. The Princess Victoria brought the survivors to Seattle.

Bounty for Shipbuilders.—A telegram from Mr. A. F. Yarrow has been posted in his firm's works at Scotstoun on the Clyde, to the effect that if the firm are fully satisfied with the speed of completion, when the last of the three new destroyers, Miranda, Minos, and Manly, on which their men are working night and day and on Sundays, has been handed over, $5,000 will be distributed among the leading hands and others.

Winnipeg, Man.—Six men and a woman had a narrow escape from death when the steamer Mount Cashel, owned by E. D. Moore, caught fire at the Hyland Navigation Co.'s dock on September 9. They were clothed in night attire, and jumped from the burning vessel to the wharf. The vessel is a total loss, the damage being estimated at from $60,000 to $70,000. Incendiarism is suspected. There was no insurance.

Sarnia, Ont.—The wrecked steamer Howard M. Hanna, Jun., which was blown on the west shore of Lake Huron in the big November storm and was rescued by the Reid Wrecking Co., was towed away from here recently by Reid tugs. It was reported that the boat had been sold to Canadian steamboat interests, and that it is being taken to Collingwood to be rebuilt. The purchase of the boat in her present condition would allow Canadians to enroll her as a Canadian hull.

Victoria, B.C.—The contract for repairs to the Canadian Pacific steamship Princess Victoria, which was in collision with the steamer Admiral Sampson off Point-no-Point, has been awarded to Yarrows, Ltd., of Esquimalt. The amount covering the repair contract has not been disclosed. It is understood that about sixteen bow plates will have to be renewed and a section of the stem will have to be replaced. Bids were tendered by several Coast shipbuilding firms, and the successful tenderer proved to be Yarrows, Ltd.

R. H. Buchanan, & Co., Montreal, Que., have been awarded a contract for two

vertical turbine centrifugal pumps and electric motors. The pumps will be used for fire service at the Canadian Vickers, Ltd., shipbuilding plant, Maisonneuve, Que., and each will have a capacity of 1,500 gallons per minute, against a head of 372 feet. They are Pulsometer Engineering Co. manufacture. The electric motors are vertical type, and along with control gears will be manufactured by Vickers, Ltd., Sheffield, England; each being of 250 h.p., 2,200 volts, 1,160 r.p.m.

Speed Regulations in Panama Canal.—An executive order, issued recently, provides rules and regulations for speed in the Panama Canal. For instance, vessels are limited to six knots per hour in the Culebra Cut, while, when approaching turns, they shall maintain the slowest speed that will enable them to keep their headway. In Gatun Lake, howhowever, in the 1,000-foot channels, a speed of 15 knots an hour will be allowed, and in the 500-foot channels, 10 knots. Everywhere else in the locks and in the entrances to the ports, the 6-knot rule will prevail.

Port Dalhousie, Ont.—Muir Bros. Dry Dock Co., have made extensive repairs to their two dry docks, having put in new gates and a concrete apron in front of same with sheet piling. This has successfully cut off the leaks which kept the floor of the docks wet last summer. They are now in good shape. The dry dock gates, which the new ones replace, were hung fifty years ago, and, even after this long period of continual use, the timbers were found to be perfectly sound and the gates good except that the spaces between the timbers here and there allowed water to come through.

Sault Ste. Marie, Ont.—A large crane for use in the construction of the dry dock and shipbuilding plant has arrived here from London, England, and two more cranes are expected shortly. According to Mr. Shoud, the representative of the British Construction Co., which has the contract, this is part of the construction plant which his company purchased recently in England. On account of the war, he said, it was unlikely that actual work would be commenced before spring. The company already have expended over $100,000, which he thought was a pretty fair guarantee of their good intentions.

Salving G. T. P. Steamship Price Albert.—There seems to be no intention on the part of the G. T. P. to abandon the steamship Prince Albert, which went ashore at Triple Point, Brown Passage, when bound from the Queen Charlotte Islands to Price Rupert. The steamer settled in such a position that it was at first thought she would be a total loss, but now comes the word that the salvors are hard at work, and the floating of the ship into deep water is considered feasible. The Prince Albert is badly listed between two ledges of rock, but it is maintained by those in charge of the salvage operations that she can be successfully floated, providing, of course, the weather is propitious. Since the vessel went ashore the salvage steamer Salvor, of the B. C. Salvage Co. has been standing by, and at least two attempts have been made to pull her into deep water.

M. Beatty & Sons, Ltd., Welland, Ont., builders of dredges and excavating equipment, recently launched a dipper dredge at their shipyards on the Welland canal. She has been built for The Randolph Macdonald Co., Toronto, and will be of the boom and A-frame type with a 3½ cubic yard dipper to work in thirty feet of water. The steel hull is 107 feet long with 36 foot beam. It is 9 feet 3 inches deep at the bow and 8 feet 3 inches at the stern. The boiler is of the Scotch marine type and is of ample size to furnish steam for the entire dredging plant when working under heavy load. Worthy of note are the bow anchors. Instead of wood, these are made of steel plating, 28 in. x 30 in. x 55 ft., with a circular reinforcement on the inside, forced into place and firmly riveted. All the sheaves and bearings as well as the anchor points are of open hearth steel castings. The builders expect to finish work on the dredge early this fall.

Ottawa, Ont.—An important Order-in-Council of vital interest to the city of Vancouver was passed by the Cabinet on September 5. The Order-in-Council is the contract for a subsidy with the Amalgamated Engineering Works, Ltd., of British Columbia, for the construction of modern drydocks at Vancouver to cost six and a half million dollars. It is understood that the financing was completed in London before the war broke out, so that as soon as a few details are completed work can be started without delay. The report of the engineer who has been investigating the question provides for a first-class modern drydock capable of handling the largest ocean steamers or British warships. The drydock will be 1150 feet long and 100 feet wide and capable of being divided into two sections, one 650 feet long and the other 500 feet. It will be one of the largest drydocks in the world. The subsidy will cover five and a half million dollars, the maximum allowed under the Drydock Subsidy Act at four per cent. for 35 years.

Fastnet Rock Lighthouse Tower.—The latest big feat of the lighthouse engineer in British waters is the building of the new tower on the Fastnet Rock, a small pinnacle off the coast of Ireland. It cost less than $2,100,000, though it should be added that in this item is included the expenses of a special steamer that was built to carry the stone blocks to the rock. The light is given by a series of incandescent burners, producing a power of 1,200 candles. By means of mirrors this is intensified and concentrated into a single flash of 750,000 candle-power, and capable of being seen, on a clear night, twenty miles out at sea. It is a remarkable fact that, despite the wonderful advance which electricity has made, oil is still generally used in lighthouses. The truth is, electricity has been found too costly for lighthouse work, and there are few stations that boast of their electrical installations, the most famous exception being the Heligoland lighthouse, whose electrical beams are equal to 43,000,000 candle-power. The light here alone costs $5,000 a year to maintain.

The Australian Navy.—The Royal Australian Navy comprises the battleship Australia (built by John Brown & Co., on the Clyde), having a displacement of 19,200 tons; the second-class protected cruiser Melbourne (built by Cammell Laird & Co., Birkenhead), having a displacement of 5,600 tons; the second-class protected cruiser Sydney (built by the London & Glasgow Engineering & Shipbuilding Co., on the Clyde) and a sister ship of the Melbourne; the second-class protected cruiser Brisbane (built at the Commonwealth Dockyard, Cockatoo Island, Sydney) a sister ship to the Melbourne; the second-class protected cruiser Encounter, lent by the Lords of the Admiralty for training purposes, and having a displacement of 5,888 tons; the ocean-going torpedo-destroyer Parramatta, having a displacement of 700 tons; the Yarra and the Warrego, sister ships to the Parramatta; and the Derwent, the Swan, and the Torrens, three further sister ships to the Parramatta (built at the Commonwealth Dockyard, Cockatoo Island, Sydney); the submarine AE 1 (built by Vickers, Ltd, Barrow), having a displacement of 800 tons; and the A E 2 (built by Vickers, Ltd.), a sister ship to the A E 1. The battle cruiser Australia is fitted with turbine engines, giving her a speed of 26 knots. She is 578 ft. long by 79 ft. 6 in. beam, and carries 24 guns and two 21-in. submarine lance torpedo tubes. The Melbourne is fitted with turbine engines giving her a speed of 26 knots. She is 430 ft. long by 48 ft. 6 in. beam, and carries 12 guns and two 21-in lance torpedo tubes. The second-class protected cruiser Brisbane is expected to be delivered in February, 1915. The torpedo-boat destroyers Parramatta, Yarra and Warrego are each 245 ft. long by 24 ft. 3 in. beam; and each carries four guns and three 8-in lance torpedo tubes.

ASSOCIATION AND PERSONAL

A Monthly Record of Current Association News and of Individuals
Who Have Been More or Less Prominent in Marine Circles

Alphonse Duval, of St. Lambert, Que., has been appointed Inspector of ships' tackle at the Port of Montreal.

Sir Stephen Wilson Furness, widely known in the British shipping world, died on September 6. He was born in 1872.

R. L. Newman, the chief engineer of the Superior Dry Dock and Ship Building Co., passed through Sault Ste. Marie, Ont., en route to the west.

Theo. A. Frey, fiscal agent to the Dominion Shipbuilding, Engineering and Drydock Co., left Vancouver for the East on August 19, on the company's business, and, circumstances permitting, will sail from New York for London to represent the Canadian-American interests of the company at a meeting of the European board to be held there.

James Bailey, for nearly half a century with the Robert Reford Co., 35 years of which he was marine superintendent for the Cunard and Thompson Lines, died at Montreal on September 15. As a youth he came from Ireland to Toronto, where he entered the employ of Reford & Dillon, which concern moved to Montreal in 1869. While at Toronto Mr. Bailey was a member of the Queen's Own Rifles, and served at Ridgeway.

Sir John Jackson (Canada) Ltd., have offered and placed at the disposal of the Ministers of Militia and Marine the services of the whole of their engineering staff, employees, plant and equipment, at Victoria, B.C., for any construction or other work, should they require such services for the defence of Victoria and vicinity. The firm employs a large staff of skilled engineers on the contract for the breakwater at the Outer Harbor, Victoria, and as the plant is most extensive and comprehensive, it is felt that, should occasion arise, the assistance which would be rendered the Militia and Naval Departments of the Government would be invaluable. In the building of entrenchments, the throwing up of defence works, the erection of additional forts and harbor fortifications generally, the service which the staff and plant of the company would perform would represent a tremendous asset to the Government.

Captain H. St. George Lindsay, superintendent of pilots, has been temporarily lent by the Marine Department to the Department of Militia and Defence in connection with the transportation of Canadian troops to the scene of war. He will inspect all the troopships employed, and act in any other capacity required.

William Edwin Redway, consulting naval architect, died Saturday morning, September 19, at his residence, 473 Broadview Avenue, after a short illness. Mr. Redway was born in Exmouth, Devon, England, and entered upon the shipbuilding business early in life. In 1884 he was elected a member of the Institute of Naval Architects. He came to Canada in the fall of the same year. For thirty years he was connected with the Doughty Engine Co. and the Polson Iron Works. Latterly, however, he had become an independent consulting naval architect. One of Mr. Redway's most recent accomplishments was the designing of a patent self-closing watertight hatchway, the necessity for which was brought about by the Great Lakes disaster of November 9 last year. This hatch is now under consideration and investigation by the American Steel Shipbuilding Co. of Cleveland. He had also designed a 500-foot self-trimming cargo ship, for which the contract has been let to a big shipbuilding firm for a Canadian shipping interest. Mr. Redway was not only well known to Canadian shipping interests, but to American marine and shipping men.

LICENSED PILOTS.

River St. Lawrence.—Captain Walter Collins, 43 Main Street, Kingston, Ont.; Captain M. McDonald, River Hotel, Kingston, Ont.; Captain Charles J. Martin, 13 Balaclava Street, Kingston, Ont.; Captain T. J. Murphy, 11 William Street, Kingston, Ont.

River St. Lawrence, Bay of Quinte, Murray Canal.—Captain James Murray, 106 Clergy Street, Kingston, Ont.; Capt. James H. Martin, 259 Johnston Street, Kingston, Ont.; John Corkery, 17 Rideau Street, Kingston, Ont.; Captain Daniel H. Mills, 272 University Avenue, Kingston, Ont.

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Midland,	12	Jos. Silverthorne,	Midland,	Jno. A. Murphy,	Midland, Ont.
Halifax,	13	Robt. Blair,	29 Preston Street,	Chas. E. Pearce,	Portland St., Dartmouth, N.S.
Sault Ste. Marie	14	A. E. Lewis,	Box 563, Soo, Ont.,	Geo. S. Biggar,	43 Grosvenor Ave., Sault Ste Marie.
Charlottetown,	15	J. F. McGuigan,	38 Queen Street,	Lem Winchester,	302 Fitzroy St., Charlottetown, P.E.I.
Twin City,	16	Wm. Faloona,	392 Ambrose Street,	Lloyd Williams,	142 Secord St., Fort William, Ont.

STORY OF BRITAIN'S LIGHT-HOUSES.—II*

By M. W. Roberts.**

ON PAGE 184 of our August issue will be found the introductory article on the Story of Britain's Lighthouses and what follows here is a continuation of the individual record of the best known of these.

Submarine Bell Feature.

The first light vessel equipped in British water was the North-West Lightship in December, 1906, and if the light-vessels round the coast were fitted with submarine bells it would be possible for ships fitted with receiving apparatus to navigate in fog with almost as great certainty as in clear weather.

The receiving apparatus consists of two cast-iron receiver tanks securely fixed against the skin inside the ship, one on each bow, and as far below the water line as possible. Each tank contains two microphones of special construction, and the bell sound passing through the sea is transmitted to them. Electric wires lead from the microphones to an indicator box situated in the wheel-house or the chart-room. This box is provided with two telephone receivers and a "port" and "starboard" switch.

In foggy weather a vessel uncertain of her position, and wishing to pick up a transmitting station, stops her engines, or at least reduces speed. The officer on watch switches the apparatus, say, to the starboard side, and listens for the sound of the submarine bell. If no signal is heard the switch is reversed to the port side. Supposing a signal is heard on the port side, then the vessel's head is slowly turned in that direction. When bearing nearly right ahead, the sound is deflected and cannot be heard, and the direction of the ship's head is then carefully noted by compass. The vessel now continues to turn in the same direction until the sound of the bell is heard on the starboard bow; the turning movement is then reversed, and she is slowly swung to starboard, the direction of the ship's head being again carefully noted when the sound of the bell is lost. The mean of the two bearings will give the approximate direction of the lightship, but to ensure accuracy the manoeuvre described should be repeated.

The "South Stack."

South Stack was first lighted in the year 1809, and is the guide for all vessels after passing the Smalls Light and Tuskar Light on the Irish coast on their way to Liverpool. To get to the light-house, you have to climb the mountain and then descend down to the light-house, some 365 steps, and cross a bridge before arriving at your destination. A donkey used to walk up and down these steps with the coal on his back when replenishing the coal cellar. It is now hove up by a crane.

The "Smalls" Light.

"The Smalls" was provided with only two keepers when it was first completed, and on one occasion out of the two, one died. His companion was afraid to commit the body of the dead man to the sea lest he should be suspected of foul play, so he sewed it up in canvas and hung it outside of the lantern to await his relief. Their spell on duty in those days was four months, and it was some time before the relief arrived. When the relief arrived they found in the man who was in charge a shatered wreck tending the lights who had never neglected his duty under the trying and weird circumstances, but nevertheless he had become a broken down and aged man under the trying ordeal. After this experience three men were placed in all lighthouses on rocks which were water-bound.

The "Mumbles" Lighthouse.

The keeper of Mumbles Lighthouse, Jasper Williams, died on January 31st last, after 28 years' service at the one light. A nice little story concerns the origin of the lighthouse at Bridgewater. Years ago, before ever a light was there, a fisherman's widow lived down by the sea front. Her husband had been drowned at sea, and sorrow had turned her brain; but night after night, for the rest of her life, she placed a lamp in the cottage window to guide the husband who was never to return. At last the day came when she died, and the light was no longer there — the light which, by this time, the fishermen had got used to looking for; so the clergyman of the town built a harbor-light at his own expense, and levied upon the owners of craft a toll for its maintenance. Eventually the authorities of Trinity House (the people responsible for the lighthouses of England) took it over, and built the present lighthouse.

In the year 1836, the Brethren of Trinity, by a special Act of Parliament, decided to purchase the lights which had been provided, both by the Crown and private interest, so as to bring the control under one corporation.

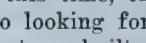
The First "Bishop" Light.

The first Bishop Light was of the iron-screw pile principle. The legs were sunk into granite and stayed with wrought iron rods, the engineers stating at the time that the waves would wash between the rods, so that the skeleton building would escape the heavy seas, which a solid stone building would have given great resistance to. The engineers' contention proved wrong, when it was pitted against the forces of nature. The heavy tempests at times, which showed a wind pressure of 700 lbs. per square foot, during a heavy gale one night broke up all the stays, and carried away the whole structure, revealing only a few lengths of the tubes at low water on the next tide.

That was the first attempt to build the Bishop Light. However, the engineer, James Walker, was not dismayed. He decided to erect a masonry tower, with the Smeaton type for his model. The greatest difficulty was the trimming of the rocks which were only 150 ft. in length and 52 ft. wide, to receive the first blocks, which had to be laid one ft. below the low water mark. A cofferdam was erected, and the water pumped out, so that the masons could work on a dry surface.

In 1878 after seven years' arduous labor, the lighthouse was finished, and the dreaded rock was marked with a powerful light and foghorn to warn the mariner. The Bishop light requires men as keepers with iron nerves for a long experience of imprisonment on a lonely rock, for when the Atlantic seas are aroused to fury, the noise created by the waves against the lighthouse is so deafening that the keepers can only converse by signs to one another. This applies to all lighthouses built on similar rocks, such as the Bell, Chickin, Skerryvore, etc. On one occasion a heavy sea slipped up the face of the lighthouse and washed away the fog bell, weighing 550 lbs, from its fastenings, breaking it to pieces on the rocks below. There is a piece of the bell now in the museum of Trinity House, kept there as a memento. An explosive is fired now every five minutes during fog.

*From a recent lecture on the subject.
**Chairman, Liverpool Pilots Association.



N. B. O. Packings are dealt with fully in a leaflet issued by William C. Wilson & Co., Toronto, Ont., sales agents for the Home Rubber Co., Trenton, N.J. The various brands are described at length and the work for which each is intended is stated. Other products dealt with include N. B. O. gaskets, rings, moulded pieces, pump valves and tubular gaskets, etc.

Allan Line Fleet.—Practically the whole of the Allan Line fleet has been taken over by the British Admiralty for transport service. Added to the liners Alsatian, Victorian and Corsican, previously reported under charter, the Corinthian, Tunisian, Grampian and Ionian have also been requistioned for Admiralty service. In view of the wholesale charters, the transatlantic service of the Allan Line, with the exception of one or two vessels, will be suspended until October 1, when the steamship Scotian is posted to leave Liverpool for Halifax.

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Vol. IV. Publication Office, Toronto—October, 1914 No. 10

Valve Mechanism, The Weir Reciprocating Steam Pump

Staff Article

With the continual advance to higher degree perfection of vessel propelling machinery, it became incumbent on those who specialized in the manufacture of auxiliary and accessory equipment to at least keep pace, and in no department of the latter (due largely to their increased applications), has more substantial progress in the dual direction of efficiency and reliability been made than in that of the design of reciprocating steam pumps.

THE design of reciprocating pumps driven by steam has always presented difficulties not usually encountered in other forms of reciprocating engines. In the early days of pumps, weight of machine and efficiency of operation did not enter as vitally into the calculations as they do to-day, it being often sufficient that the pump would work and be nominally reliable. However, duties of pumps have become more severe and users have demanded higher efficiencies.

Water being practically an incompressible fluid, presents certain problems

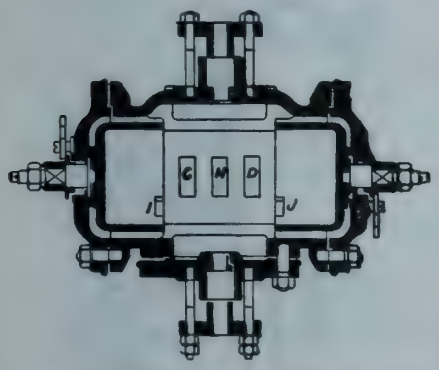


FIG. 1. VERTICAL SECTION OF STEAM CHEST THROUGH CENTRE LINE OF AUXILIARY VALVE STEM. VALVES REMOVED SHOWING MAIN VALVE SEAT.

which make the expansive use of steam rather hard to realize in pumping cylinders, and since designers have for the most part done away with flywheels, the problem of actuating the valve and at the same time eliminating the possibility of the machine becoming centred, has assumed new proportions. Nearly every other type of engine in use depends upon motion obtained from a revolving shaft to actuate its valve link motion, but the small and medium sized pumps of to-day have no circular motion imparted to their moving parts, thus this method of operating the valves must be left out of all consideration of the subject.

Pump Design Development.

There have been many very succesful designs of pumps developed and several principles have come to be recognized as standard. The duplex pump is about the commonest type encountered, being most generally used in small units for boiler feed and service purposes. It is not an expensive type of pump although some firms manufacturing it have enlarged on the original idea of a duplex and have made them with compound steam cylinders, and outside packed, double acting, water cylinders. The fact that the pump is duplex makes the valve operating problems somewhat more simple. The single cylinder type of pump presents more serious problems. In its class, however, there are many very efficient designs, and perhaps the most widely known of this type is the Weir Pump of British manufacture.

G. & J. Weir have been identified with the pump business for many years and at Catheart, Glasgow, Scotland, have one of the best equipped factories in Great Britain. Its best efforts are devoted to the manufacture of steam driven pumps. The same underlying principles of design have been applied to small medium and large sized units.

The Weir pump has been utilized largely in all places where such an auxiliary is required, its most important uses being for marine, stationary, and locomotive boiler feeds. The pump also finds favor as a service unit where its duties are particularly severe.

Air pumps to be used in connection with condensing installations, are also made, the general design being that of the single cylinder vertical type, although the horizontal type is used in a number and variety of instances. The outstanding features of the pump are its reliability and efficiency. It is particularly suited for marine auxiliary work as is evidenced by the fact that it is in general use in twenty-four navies including the British, French, Russian and German, around which so much in-

FIG. 2. HORIZONTAL SECTION THROUGH STEAM CHEST SHOWING VALVES.

terest is centred at the present time. The chief merchant marine vessels are also large users. This reception, in circles whose demands are so difficult to fulfil, is in itself a striking testimony to the merits of the Weir product.

The Valve Feature.

The one outstanding feature of Weir pumps is the steam valve, and after all, the valve is really the brain, as it were, of any steam engine. In what follows, an attempt will be made to describe the valve of a single cylinder vertical pump throughout its whole cycle of operation.

The steam valve consists of two moving parts, each separate valves in themselves, and known as the main and the auxiliary valves. The function of the main valve is to distribute steam to the

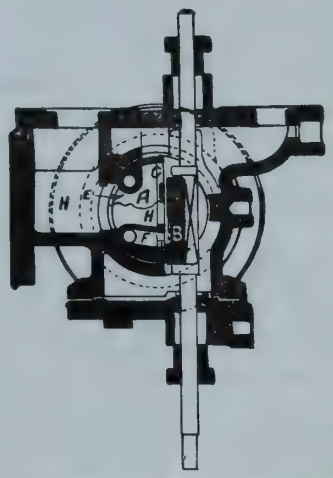


FIG. 3. VERTICAL SECTION THROUGH STEAM CHEST, SHOWING VALVES.

cylinder. The main valve is half round in its central cross-section, but at each end the casting is extended and this extension has a circular cross section. The main valve seat is bored out to fit the valve. The motion of the main valve is entirely horizontal, and on the back of its central, semi-circular section, is a flat machined surface which is the seat of the auxiliary valve. The motion of the auxiliary valve is entirely vertical and this motion is received through a link motion from the piston rod.

The function of the auxiliary valve is a double one. It has to distribute steam to either end of the main valve in such a manner as to cause it to move from end to end of the steam chest so as to accomplish its duty of delivering steam to the cylinder. The second duty of the auxiliary valve is to cut off the steam from admission to the cylinder at the proper time in the cycle of operation. These valves have been so ingeniously designed that full and complete strokes are made at all speeds of operation. Both

valves are of the slide type, and the main valve cannot rest except at the end of its stroke.

The main valve has only the one simple horizontal movement, while the auxiliary valve has the simple vertical motion, but as its valve seat, the main valve, moves,

FIG. 4. AUXILIARY VALVE.

the auxiliary valve has here a relative motion in addition to its real motion, and this relative motion must be closely studied. The arrangement of this double valve is such that it is impossible for a dead centre to occur.

The cylindrical ends of the main valve are turned round, while the ends are left flat. Over these round ends are placed caps forming closed cylinders in which the flat round ends of the main valve act as pistons and so contribute to the horizontal motion of the main valve. Through ports on the back of the main valve, the auxiliary valve admits steam to these cylindrical chambers, and this steam be-

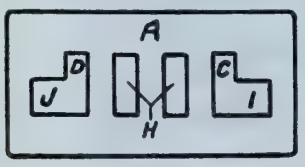


FIG. 5. SEMI-CIRCULAR FACE OF MAIN VALVE.

ing thus distributed to the ends of the main valve gives to the latter its motion.

The auxiliary valve accomplishes the cut-off at about three-quarters of the piston stroke; thus the last quarter of the stroke is the result of expansion. This transmits to the pump a very smooth and regular motion, allows all water valves to settle quietly, and relieves all water connections from undue shock.

Cycle of Operation

In following the valve through a complete cycle, it will be necessary to refer constantly to the figures 1 to 6 inclusive. The letters of reference will be found the

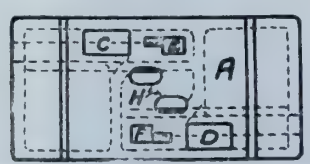


FIG. 6. BACK OF MAIN VALVE SHOWING AUXILIARY VALVE SEAT.

same in all of the six figures. Starting with the piston at the bottom of its stroke, the main valve A is at the right hand end of the steam chest, as shown in Fig. 2. It is in this position because the port E (Fig. 2 and Fig. 6) is open to live steam. This port leads to the left chamber at the end of the main valve and thus holds the valve to the right. The auxiliary valve B is at the bottom position in its travel and, as the main valve A is to the right position of its travel, the auxiliary valve B is at the lower left corner of its valve seat on the back of the main valve A. In this position the top edge of the auxiliary valve B is just flush with the bottom edge of the port C (Fig. 6). Thus the port C is open to the live steam. Now the port C leads to the bottom of the cylinder below the piston, and thus the piston starts to move upward.

Key to Fig. 7.

1.—Steam slide valve chest.
2.—Double joint.
3.—Front stay.
4.—Bottom spindle.
5.—Valve gear levers.
6.—Front stay bush pin.
7.—Ball crosshead.
8.—Main crosshead.
9.—Crosshead pin.
10.—Piston rod.
11.—Piston body.
12.—Piston rings.
13.—Cylinder cover.
14.—Discharge valve seat.
15.—Discharge valve seat ring.
16.—Suction valve seat.
17.—Suction valve guard.
18.—Discharge valve guard.
19.—Water valves.
20.—Bucket.
21.—Pump rod.
22.—Pump cover.
23.—Valve Chest covers.
24.—Steam stop valve.
25.—Exhaust stop valve.
26.—Auxiliary valve spindle.

Cycle of Operation (Cont'd).

By referring to Fig. 7, the link motion which actuates the auxiliary valve A can be seen. Through the crosshead pin 9 the gear lever 5 is caused to move about the fixed stay bush pin 6 by the motion of the rod 10. The little ball crosshead 7 moves up and down on the valve stem bottom spindle 4, and as soon as this little crosshead comes up against the adjustable nut collars on the bottom spindle, it moves the latter, and thus the valve B receives its motion. The adjustable nut collars are so set that the valve stem spindle starts to move at just half stroke of the piston.

To return again to the valve chamber, we have left the ports E and C (Fig. 6) open to live steam. The piston has started to move upward. As soon as the piston reaches its half stroke, the piston rod starts to move the auxiliary valve B and, immediately the auxiliary valve B starts to move upward, it starts to cover the port C (Fig. 6). At three-quarters piston stroke, the port C is fully covered and cut-off is accomplished. The remaining quarter stroke is completed by the expansion of the steam. As the piston reaches the top of its stroke, the auxiliary valve B moves over the port E (Fig. 6) and thus cuts off the chamber to the left of the main valve from its connection with the live steam.

By referring to Fig. 4, it will be noted that the shape of the hollow on the face of the auxiliary valve is shown by dotted lines. This hollow portion, as the travel of the auxiliary valve B continues upward, registers over the port E (Fig. 6) and the upper port H (Fig. 6) also registers against the hollow on the face of the auxiliary valve B. As the port H (Fig. 6) connects with the main exhaust port, the steam from the left hand end chamber of the main valve A is open to exhaust and, as the auxiliary valve B is opening the port E to exhaust, it also

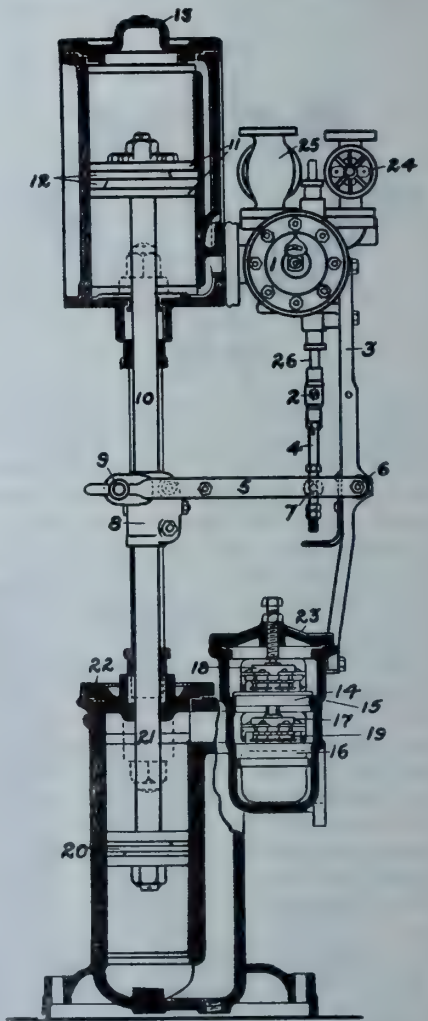


FIG. 7. SECTION THROUGH "WEIR" FEED PUMP.

is opening to live steam the port F (Fig. 6).

Now the port F leads to the right end chamber of the main valve A, and as soon as the port F is opened to live steam and the port E opened to exhaust,

the steam pressure against the right hand end of the main valve causes the valve to move to the left end of the steam chest. However, as the main valve A moves to the left it cuts off the port E from exhaust at about the time that the main valve has accomplished about three-quarters of its travel. The steam trapped in chamber to the left of the main valve thus cushions the valve and causes it to stop without any jar as soon as the pressures on either end of the valve are equalized. The valve motion is so timed that the main valve A has just reached the end of its travel as the piston has reached the top end of its stroke.

All along, the port D (Fig. 6) has been opened to live steam, but until the main valve A moved over to the left end of the steam chest, the port D did not register against the cylinder port D (Fig. 1), and thus the steam was not admitted to the cylinder above the piston until the main valve A had moved to the left. Now, as the steam pressure from the steam chest is acting on the top of the piston, the motion of the piston is reversed, and the piston starts on its downward stroke. When the main valve A moved to the left, it also brought the cylinder port C (Figs. 1 and 2) to register against the exhaust port H on the back of the main valve A (Figs. 2 and 5), and this port H in turn registers against the cylinder exhaust port H and makes the exhaust circuit complete. As the piston continues on its downward stroke, the steam below the piston is free to pass out.

The auxiliary valve B is now in the right upper corner of its valve seat, and the lower edge of the auxiliary valve is just flush with the upper edge of the port D (Fig. 6). When the piston has completed the half of its stroke, the valve stem picks up its motion from the piston rod, and the auxiliary valve B starts to move down over the port D and when the piston has accomplished three-quarters of its stroke, the valve B has covered the port D completely and the cut-off is accomplished. The rest of the stroke is completed by the expansion of the steam, the auxiliary valve B continuing on its downward stroke. It opens the port E (Fig. 6) to live steam, and this ports leads to the left end chamber of the main valve A. Also the port F is opened to exhaust, and as this port connects with the main valve right end chamber, the latter is opened to exhaust.

With these conditions existing, the main valve A moves over to the right end of the steam chest, and we then find conditions existing just as are shown in Fig. 2. The trapped steam at the right hand end chamber of the main valve stops the main valve as previously explained in connection with the similar event at the other end of the main valve A. The cylinder port D is next opened to exhaust through the exhaust port H at the back of the main valve A, and the port C is opened to live steam which is led to the cylinder under the piston; the cycle being about to commence again.

It has been shown that the steam to drive the pump is cut-off before the end of the stroke is reached, but the pump would not complete its stroke under certain conditions by the expansion of the steam in the cylinder. For instance, when starting and with a cold cylinder, the steam already shut in the cylinder would rapidly condense and fall below the pressure necessary to move the piston. It is, therefore, necessary to admit steam after the auxiliary valve has closed it from entering the cylinder through the main ports C or D on the face of the main valve. This is done by arranging a bye-pass for each end of the cylinder. This bye-pass can be opened by hand, and allows steam to pass into the cylinder after the auxiliary valve has closed the main port C or D leading to the bottom or top of the cylinder. These bye-passes I and J are arranged by cutting a port in the caps or small cylinders on each end and at the back of the main valve, on which a corresponding port is cut. Provision is made on each end of the steam chest to turn these cylinders on the valve and so open or close the port. By this method live steam is admitted to the cylinder as long as the ports E and F are open to live steam which is the whole length of the stroke.

The pumps are made with double acting pump cylinders.

NEW PRINCE EDWARD ISLAND CAR FERRY.

A NOT unimportant event of the present month was the launch of a train ferry steamer from the Walker yard of Sir W. G. Armstrong, Whitworth & Co., on the Tyne, England, the building order being received from the Dominion Government for the purpose of providing a connecting link across Northumberland Strait, between Prince Edward Island and the mainland.

The vessel, christened Prince Edward Island, has been constructed along somewhat unusual lines, so as to cope with average ice conditions, it being the intention that it shall be operated during all seasons of the year. The principal dimensions are:—Length, 300 feet; breadth, 54 feet; depth, 24 feet; draft, fully loaded, 18 feet. Although the vessel is, comparatively speaking, small, the propelling machinery is of considerable power, and consists of three sets of triple expansion engines, two of which are arranged aft and one forward. The scantlings also are such that the machinery may be brought safely to an almost sudden standstill when working at full power. Dining, smoking and drawing rooms, both for first and second class passengers, are provided.

The Launching Function.

The christening ceremony was performed by Mrs. Perley, wife of the Acting High Commissioner for Canada in London; and amongst the company present were the following:—Earl Grey, Hon. G. H. Perley and Mrs. Perley, Major-General Burton, Col. T. B. B. Ternan, Major and Mrs. Stephenson, Major Pedley, Lt.-Col. D. R. McDonald, Mr. and Mrs. Edwin Orde, and other distinguished guests, both English and Canadian.

J. M. Falkner, who presided, welcomed Hon. Mr. Perley, as Canada's representative, saying the company was proud to have any connection with Canada at a time when the Dominion was giving such moral and material support to Great Britain. With regard to the new vessel, Mr. Falkner said it had a displacement of about 4,500 tons, and was designed to be capable of breaking four feet of ice if necessary. The winter difficulties were considerable, and although the distance was only eight miles, at times it took 30 hours to make the journey. As a souvenir of the occasion he presented Mrs. Perley with a silver replica of an old Newcastle ship.

The Acting High Commissioner, in reply, said that the new vessel gave proof of the might of the British navy, being launched in England for Canada, to go out during a great war. In this gift to the small Province of Prince Edward Island, the Dominion Government was showing its respect for the rights of the whole people—which was the underlying principle for which the Empire was now at war.

Earl Grey followed, and said he was much interested in car ferries, and had always hoped some day to see a car ferry between Newfoundland and some port on the Quebec side. He had been told this was impossible, owing to the strong tides and also the occasional heavy weather in the Gulf. Now, however, not for the first time in his experience, he had found that the Armstrongs had achieved the supposedly impossible. He had been told that whenever there was an impossible problem confronting the people the first thing was to go to the Armstrongs and get the puzzle worked out, and this vessel showed that they were living up to their reputation. He looked for great results to Prince Edward Island and the mainland from the new service they were inaugurating.

Edward Smith, president of the Buffalo Drydock Co., and president of the Great Lakes Towing Co., has succeeded J. C. Wallace as president of the American Shipbuilding Co.

Some Practical Applications of Signalling at Sea

While always of popular interest, signalling, whether on land or sea or from one to the other is, due to the various activities engendered through our participation in the all-European War a subject which is meantime followed and studied with a fervor bordering on whole-hearted fascination. The data and illustrations reproduced from the Motor Ship and Motor Boat will in consequence appeal to our readers as being opportune.

LEAVING wireless telegraphy out of the question, the present signals in general service may be said to be grouped under three different systems, which embrace the employment of lights, flags and sound. The light signals are for use at night, and the flags by day, while sound signals may be utilized at either time. Until the introduction of the Morse code it was practically impossible to signal at night, but in recent years the use of the Morse lamp has rendered signalling after dark much more efficacious and easy to manipulate than flag signalling during the day. This has been recognized to such an extent by the British Board of Trade that the present-day officer is compelled to pass a signalling course. It is extremely easy, providing the power of the signalling lamp is sufficient, to signal over quite long distances, especially on clear nights.

Special Flag Signalling.

The present system of flag signalling is achieved by the use of 26 special flags, each representing a letter, and one flag slightly larger in size than the signalling flag, known as the code signal flag and answering pennant, this flag when hoisted always denoting that the international code is the one to be used. Fig. 1 illustrates these flags.

As it would naturally take some little time to spell out each word separately, a series of code signals known as the international code has been arranged. These are used by every country having a mercantile marine, and groups of two or three flags, each representing different letters, are made to represent whole sentences, while the C flag denotes yes and the D flag no. Similarly, other flags are employed for denoting the various movements of the vessel; for instance, P, which is a blue flag with a white centre, generally known as the Blue Peter, is frequently used to denote that the vessel is ready to sail, and sometimes to denote that a pilot is required on board. Other flags in use with the code and adopted by Great Britain constitute the Pilot Jack, this being a Union Jack with a white border around it, which is employed in most parts of Great Britain where other flags are not specified by the rules of the port authorities as the pilot signal.

As it would take up too much space to give the combinations of letters which mean the various sentences (for the whole, when published, fill a large volume), we give here three or four of the chief signals used at sea. For example:

S. B. Q.—"Report me at Lloyd's."

Q. H.—"Heave to, I have something to communicate."

B. T. F.—"I will wait while you write."

W. P. H. V.—"Steamship "Makura," 4921 tons, out of Dunedin, New Zealand."

Around the coast, the fishing boats have a series of signals of their own, and these are effected by means of two red ensigns, and a yellow and a blue flag. For instance, two red ensigns flying one over the other denotes, "I wish to communicate with you"; a red ensign flying over a yellow flag, "I wish to report a dispute with another fisherman"; a red ensign flying over a blue flag, "I am in want of provisions"; and a yellow flag over a red ensign, "I want men to help me." These are only a few instances, but it will be seen that with the four flags it is quite possible to get a large range of combinations.

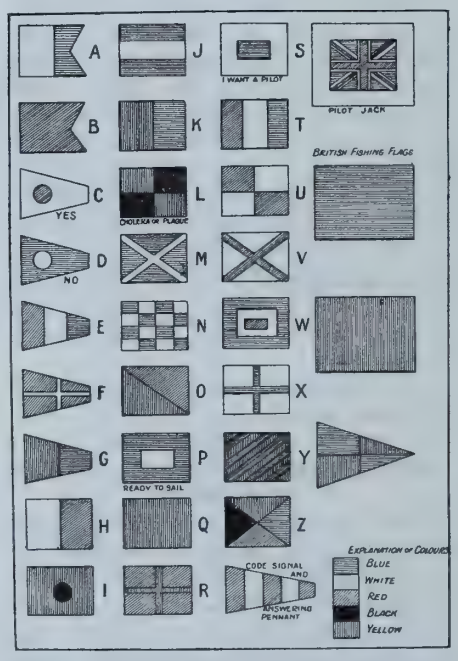


FIG. 1. FLAGS USED IN THE INTERNATIONAL SIGNALLING CODE.

Variety of Ensigns.

While on the subject of flags, it is interesting to note that the various ensigns, which are red, white and blue, consist of a Union Jack quartered in the corner of a flag with a ground of the color which gives its name to the ensign; for instance, Navy vessels always fly the white ensign (a red cross on a white ground); the Naval Reserve the blue ensign, and the Mercantile Marine a red ensign; although in many cases, where the captain of a Mercantile Marine vessel chances to be a Royal Naval Reserve man, and has a certain percentage of the crew on board his vessel who are also Naval Reserve men, he is entitled to fly the blue ensign, and most of the large transatlantic steamers do this.

The white ensign is flown by the Navy because it was the old flag of St. George, without the Union Jack quartering, as used before the Union of England with Scotland, the Scottish flag being known as the St. Andrew's Cross, a blue flag with a diagonal white cross on it. The English flag, as just stated, was a white flag with a red cross, and the combination of the flags of St. George and St. Andrew, together with the Jack, as ordered by James I during his reign. He always signed his name "Jacques," and therefore at the time of the Union the flag received the name of the Union Jack. The red cross of St. Patrick was afterwards brought into the design at the time of the Union with Ireland in 1801, which constitutes the Union Jack as it flies to-day.

Semaphore Signalling.

The second system of signalling by flags is known as the semaphore system, and is done with two small flags held in either hand, the position of one or both flags held at different points of a circle denoting various letters. Thus, if the right-hand flag is held downwards, pointing at an angle of about 60 degrees from the body, it represents A, at right angles B, at 135 degrees C, on top of the head D, and on the left-hand side E, F and G, respectively. This will be easily understood by a reference to Fig. 2, which gives the code in its various positions. It is not, of course, absolutely necessary to use flags for this, and at sea the vessels frequently have a semaphore gear fitted at the bridge, with another at the poop. This consists of a vertical post on which are hung two arms capable of describing a complete circle and operated by two hand levers. These are used for signalling at any time should the steam steering gear break down and it becomes necessary to put the manual steering gear in commission at the stern.

Other methods of signalling are by sound signals from the ship's siren or from a hand horn, the Morse code being utilized for this purpose, long and short blasts representing the dots and dashes.

Although with these various signals we are enabled to communicate at practically all times of the day and night, yet, where wireless telegraphy is not fitted on a boat, daylight signalling becomes rather monotonous and difficult. The semaphore system can only be used over a comparatively short distance, and even then it is probably necessary to watch the whole operation through a pair of binoculars. At the same time, the International Signalling Code with the flags is sometimes very troublesome, more especially when there is no wind and the flags lie drooping on their halyards. Even with a wind the process is naturally a slow one, as it is almost impossible, unless a man is in first-class practice, for him to remember the code signalling letter combinations, although naval signallers, who are practically doing nothing else, are frequently able to remember a large number of them. Even then, however, the time taken in bending and unbending the flags on the halyards renders the process a particularly slow one, and it would seem that there is room for great improvement, or for an entirely different system. It has been suggested that the heliograph would be a suitable instrument, but on the whole the experiment has proved unsuccessful; it cannot be used when there is no sun, and furthermore with the movement of a ship at sea it is very difficult to keep the reflecting mirror focussed, especially when the sea is rough.

Other forms of signalling include the use of lights shown in various combinations and at different times, as well as the discharge of rockets. These are usually utilized as distress signals from vessels requiring help. The use of a red ensign reversed at all times renotes need of help.

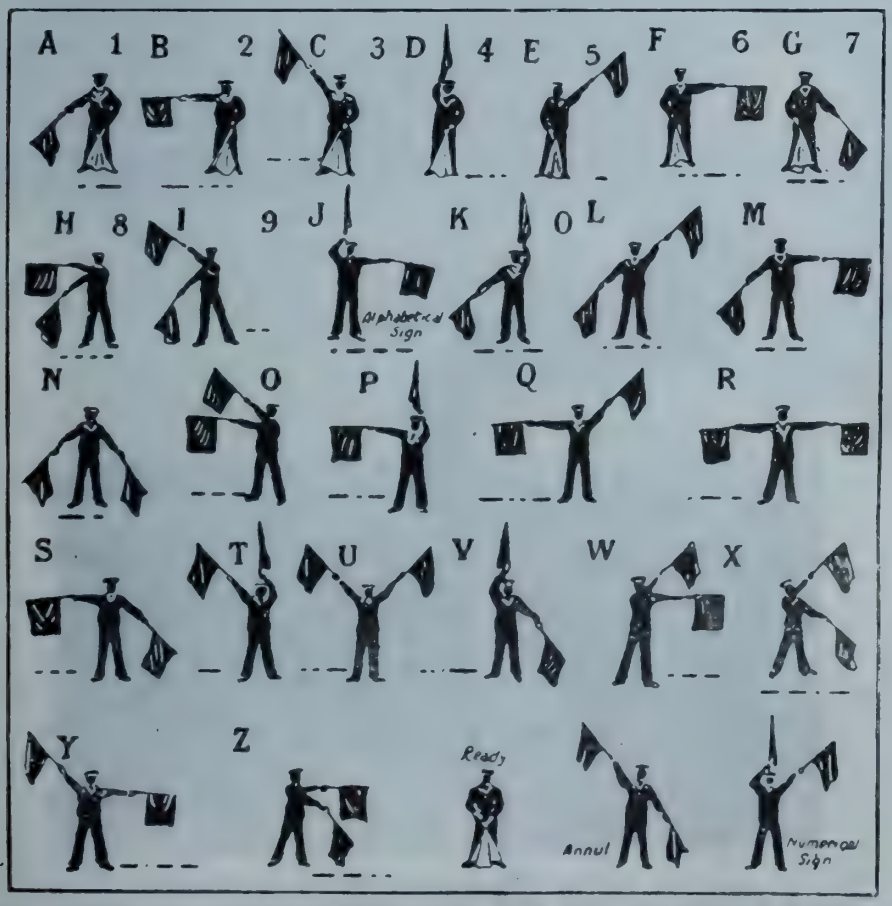


FIG. 2. CHART DEMONSTRATING SEMAPHORE CODE WITH MORSE CODE SIGNALS.

WORLD'S COMMERCE CARRIERS.

THE world's carrying powers which now include approximately 31,000 vessels with an aggregate capacity of 47 million gross tons, has nearly doubled in capacity during the last twenty years. In number, however, this commerce fleet has decreased slightly, thus showing a tendency toward larger carrying units. The figures are based upon the tonnage of all vessels of over 100 tons engaged in trade, whether domestic or foreign, on ocean, river, and lake. The U.S.A. ranks second in number and tonnage of vessels engaged in commerce, but this is due to the vast number engaged in lake and ocean coastwise trade, since the number of U.S. vesels engaged in foreign trade, according to reports received by the Bureau of Foreign and Domestic Commerce, Department of Commerce, is less than that of Great Britain, Germany, France, Italy, or Norway.

According to a recent statement of Lloyd's, out of an aggregate tonnage of 47 million gross tons in 1913-1914, 40 per cent. were credited to Great Britain, 11 per cent. to the United States, 11 per cent. to Germany, about 5 per cent. each to Norway and France, 5 per cent. each to Holland, Italy, and Japan, and from 2¼ to 1¾ per cent. to Russia, Sweden, Austria-Hungary, Denmark, and Spain. The carrying trade of the United States shows a marked growth in coastwise and lake traffic and a striking decline on the ocean. While the gross tonnage of U.S. vessels engaged in lake and coastwise trade was increasing from 3,657,304 tons in 1883 to 9,798,561 tons in 1913, that of its vessels in the foreign trade was decreasing, from 1,302,095 tons to 1,027,-776 tons, an increase in one case of 168 per cent. and a decrease in the other of 21 per cent. during a thirty-year period in which the value of the foreign trade arose from 1½ billion to 4½ billion dollars.

Overseas Commerce Volume.

The volume of the oversea commerce served by the world's merchant marine cannot be definitely stated. It is known, however, that a considerable portion of the 40 billion dollars' worth of merchandise imported and exported annually by the various nations is carried by vessel. The United Kingdom, being an island community, necessarily imports and exports all its merchandise by vessel. The United States sends about four-fifths of its exports to South American and oversea countries. Brazil sends 95 per cent. of her exports to extra-South American communities. Nearly half the goods shipped from countries in Asia is destined for extra-Asiatic communities, and practically all of Africa's trade staples find markets outside the Dark Continent. While trade between the European nations is considerable, those countries ship a large part of their surplus products to other parts of the world.

Recent consular advices indicate that many of the leading nations are enlarging their shipping facilities for trade through the Panama Canal, for it is expected that the markets of Western South America, Australasia, and Eastern Asia will be stimulated by the opening of the canal. The countries fronting on the Pacific have an aggregate import trade of over two billion dollars, and it is believed that the share of the United States in that trade will be advantageously affected through shortening of distances and improvements in transport facilities.

Constructional Features, The New Welland Ship Canal

By Henry Grantland

Whether the projected Georgian Bay Canal be a near or distant future accomplishment, or remain a dream, there is no gainsaying the fact that the undertaking here described and illustrated is the primary requirement meantime of Canadian commerce transportation on and through the Great Lakes. Enlargement of the St. Lawrence River chain of canals should, however, be a concurrent because supplementary part of the work.

CANADA is spending fifty million dollars on the construction of a new Welland Canal, and no more striking evidence of the possibilities of future development could be adduced than this enormous expenditure of money and time to further transportation on the Great Lakes.

The war has checked the work of the engineers, but not to any appreciable extent. Canada's faith in her future is shown by the aggressive energy with which the great undertaking is being pressed forward.

With almost as little concern as a millionaire might display in ordering the enlargement of his garage or the construction of a driveway through his grounds, Canada has commissioned her engineers to build a new canal across the Niagara peninsula. National housekeeping arrangements were becoming somewhat straightened at this point; facilities for moving supplies from one part of the domestic establishment to another showing signs of inadequacy. What more natural than to call up some workmen and have the matter attended to at once, precisely as an everyday housewife would summon the assistance of carpenter or plumber in case of need?

The absolute unconcern with which the nation has embarked on this enterprise at Niagara—this little bit of domestic economy, calculated to facilitate its everyday work—is one of the most remarkable features of the undertaking. Is it that the world has become so accustomed to the marvelous feats of twentieth century engineering that the building of a fifty-million-dollar ditch across a neck of land has become a mere commonplace, or is the seeming indifference rather to be attributed to a lack of knowledge? Surely it must be the latter, for never was a big national project started with less blowing of horns and beating of drums than this new Welland Canal.

Destructing to Construct.

Engineers, contractors, mechanics, navvies and workmen of many callings—a composite army of them—have invested the land and in the space of a few short months have wrought indelible changes in the togography of a beautiful countryside. They have swept down like locusts upon the green earth, and are leaving a trail of desolation behind them. To-day, their engines and cars, their steam shovels and graders, their horses and carts, and all the multiplex equipment of their construction outfits, are digging and delving, rending and tearing, and gradually working their way deeper and deeper into the earth.

What a Bird's-eye View Reveals.

A bird's-eye view of the operation, from the escarpment at Thorold, way down to the waters of Lake Ontario at Port Weller, presents a scene of picturesque activity. Right through the vineyards, the orchards and the fertile farms of this garden of Ontario, a wide swathe of virgin soil is being uncovered. Houses and barns have been raised; trees rooted up and cast aside; roads obliterated, their white ribbons lost in the great chasms dug in their path; and gently winding creeks and rivulets torn ruthlessly from their ancient channels.

The air is thick with the smoke of numerous locomotives and numerous huge and powerful steam shovels. All up and down the railway that skirts the works, and in and out of the great rifts in the earth, trains of dump cars are forever coming and going, dragging away the clay and shale that is being steadily gouged from the excavations.

It might seem almost as if all this ravenous devouring of the earth and obliterating of landmarks was planless, or at best but an indefinite striving after a vague result. There is, however, another side to the picture. In a spick and span office building situated on a quiet side street in the neighborhood of St. Catharines, away from the dust and smoke and turmoil of the construction work, a veteran engineer, surrounded by a staff of assistants, clerks and draftsmen, is busily engaged in planning every move. There the whole project is down in black and white to its minutest detail. There everything is provided for, and not a shovel of earth is raised or a wheel turned but its purpose is recorded, as forming an infinitesimal part of a gigantic whole.

The Task Involved.

The task before the builders of the new canal is no easy one. They have not simply been called upon, as many may believe, to rebuild the existing canal and, by widening and deepening its locks and channel, enlarge its facilities to meet future needs. Of only part of the present canal is this true. The remainder will be abandoned, and in its place an entirely new canal will be provided. Roughly speaking, from Lake Ontario to Thorold and for another short interval beyond, the new Welland ship canal follows a different route from that by which the present canal reaches the Lake Erie terminus.

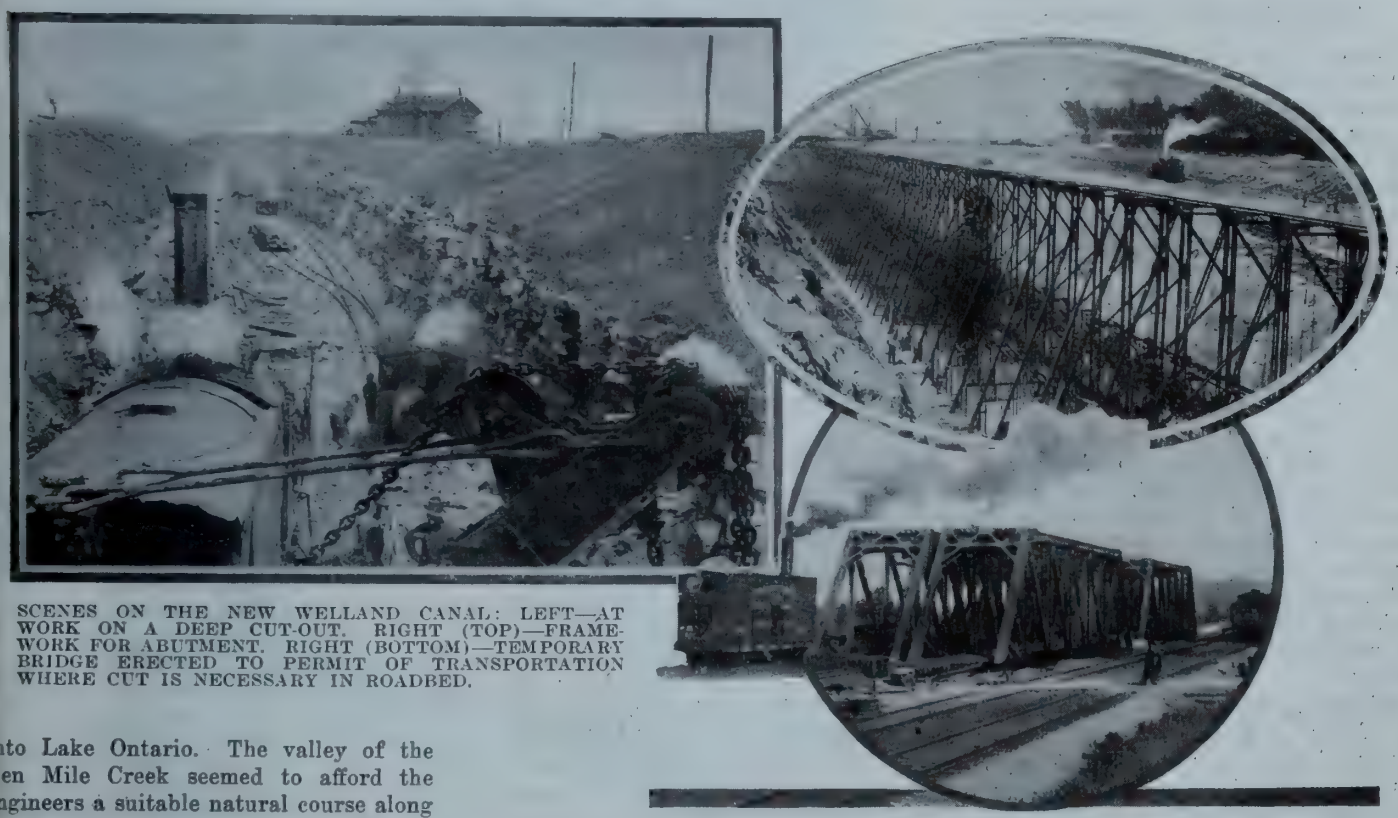
SCENE ON THE NEW WELLAND CANAL—A CUT-OUT ON THE NEW ROUTE.

The completely new character of the

waterway may be emphasized by reference to its Lake Ontario outlet. At present ships heading for the canal, en route to Lake Erie, make for the harbor of Port Dalhousie. When the new waterway is completed and in operation, they will steer for Port Weller, three miles to the east of Port Dalhousie, and that much nearer the mouth of the Niagara River.

Port Weller.

As a place on the map of Canada, Port Weller came into being with the beginning of the work on the new canal. Prior to that time, its site was occupied by the mouth of Ten Mile Creek, an insignificant little stream, which, flowing through a narrow valley, found its way at last into Lake Ontario. The valley of the Ten Mile Creek seemed to afford the engineers a suitable natural course along which to carry their channel, and it was finally selected as the most advantageous route for the new canal.



SCENES ON THE NEW WELLAND CANAL: LEFT—AT WORK ON A DEEP CUT-OUT. RIGHT (TOP)—FRAMEWORK FOR ABUTMENT. RIGHT (BOTTOM)—TEMPORARY BRIDGE ERECTED TO PERMIT OF TRANSPORTATION WHERE CUT IS NECESSARY IN ROADBED.

An Artificial Harbor Forming.

A striking change has been wrought within a twelve-month at the lonely outlet of the creek. Where before, the wild grass grew, birds made their homes and the quiet of a peaceful countryside brooded, now men and their grimy machines are working a metamorphosis. Two long sinuous arms are being thrown far out into the water of the lake, one on either side of the former mouth of the creek. Built of the tons of material that are being gouged from the inland hills, they are being steadily widened and extended by the constant discharging of trainloads of earth and clay. Eventually these arms, which will form the piers protecting the harbor, will stretch out a mile and a half into the lake, making a vast artificial harbor in which a large fleet of ships can tie up in safety.

Meanwhile dredges are dipping great buckets of mud from the inner end of the harbor and gradually removing the old shore bottom to give sufficient depth for future requirements. Tugs are busy towing loaded scows out around the piers, there to be unloaded and returned. Pile drivers are sinking great wooden posts to anchor the material and form the core of the piers, and all the time big locomotives are arriving with loaded cars in their train and puffing back with empties. Of a truth the building of the harbor of Port Weller in itself is an undertaking of great magnitude and importance, and even alone might be regarded as a work of unusual interest.

A ridge of land, on which a pool of water lying gives pathetic reminder of the former existence of Ten Mile Creek, separates the embryo harbor from the beginning of the canal work proper. This ridge, forming a natural barrier against the waters of the lake, will remain undisturbed until the canal is completed. Its removal will then put the finishing touch to the work by allowing the water to flow into the lower reach.

Just beyond the ridge one comes upon a scene that gives some idea of the magnitude of the project. Here the work of excavation has been carried to a great depth, especially on the right-hand side, where the retaining wall is in process of construction. The latter is being built of great triangular steel skeletons standing on a solid concrete foundation. The steel is reinforced with iron rods and encased in cement, after which sand and gravel are piled into the cavities, the whole forming a wall as strong as solid concrete, but of more economical construction. These reinforced walls will be carried from the piers of the harbor as far as the entrance to the first lock, which is to be located fairly near the shore.

A Temporary But Complete Railway.

One cannot be long in the neighborhood of the works before noting the extraordinary provision that is being made for the expeditious conduct of the vast undertaking. Take for instance transportation. A completely-equipped double-track railway now extends along the right-hand side of the canal property from Port Weller almost to Thorold. In construction and equipment this road is on a parity with many of the standard lines in Canada. It is well ballasted, is provided with heavy rails and has telephonic equipment for despatching. Switchmen are furnished with shelters that would accommodate small-sized families quite comfortably, while at intersections with other railways, the diamonds are protected by the regulation semaphores and watchmen's cabins.

The railway has various uses. It is employed for the most part in carrying the material excavated by the steam shovels to the piers at Port Weller. At

various points stub lines branch off and run down into the excavations, and along these the trains are operated. The road also has some employment in conveying materials and supplies to the points where they are required. This use will be considerably enlarged when the big stone crusher erected near the rock cuts at Thorold begins work. The crushed stone will be conveyed by rail to Port Weller, where it will be used in the extensive concrete work that will have to be undertaken there. Finally a not unimportant use to which the railway is put is in enabling the engineers and contractors to move along rapidly from one point to another. By utilizing gasoline track cars this purpose can be readily and expeditiously achieved.

A New Method of Excavation.

There are many interesting phases of the work even at the present stage of construction. Thus at one point where a great earthen wall is being built, which will eventually form the side of a reservoir pond , a contractor's outfit from down the Mississippi is engaged. This consists of a number of elevating graders drawn by steam tractors and several score of carts and mules. The graders move along slowly and as they go the earth alongside is sliced off and carried up and over the machine, and is dumped into one of the carts that is driven beside it. When the cart is filled, it moves off, is hauled up to the top of the wall and its contents unloaded. The procession continues all day, the capacity of a machine being about forty cartloads per hour. Of course, as compared with a steam shovel, it is comparatively slow work but this method of constructing an embankment is found to be very efficient.

It has been mentioned that the building of the canal is altering the topography of the country. Of nothing is this truer than of the existing railways. Near Thorold the track of the Port Colborne line of the Grand Trunk lay right across the route of the canal. To get it out of the way in order that it might not interfere with the work, the engineers of the canal had to arrange a long deviation. This necessitated a heavy rock cut through a corner of a hill, and must have cost many thousand dollars.

An Expensive Expedient

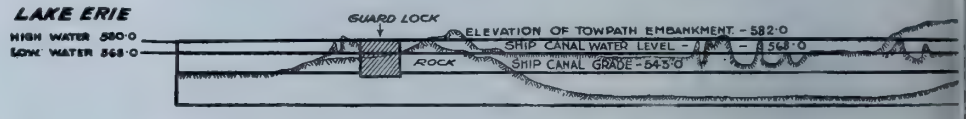
Down lower, where the route of the canal intersects the main line of the Grand Trunk, a temporary deviation was found to be necessary, since the railway runs just about where the entrance to Lock No. 4 will be located. Here the road is being diverted a short distance to the left. Oddly enough, a fine big steel three-span bridge is being erected for the deviation, though at present there would seem to be no need for a bridge at all. There is no water underneath and very little depression in the ground. The idea is, however, to cut away the earth below it and, when the lock is completed, to restore the track to its former location.

THE SOUTHERN TERMINUS OF THE NEW CANAL AT PORT WELLER, SHOWING THE WORK THAT IS BEING DONE IN THE CONSTRUCTION OF PIERS.

New Canal Shorter Than Old.

The effect of running the new canal in an air-line from Port Weller to Thorold will be to reduce the length of the waterway between the two lakes considerably. The present canal is twenty-six and three-quarter miles long; the new one is to be twenty-five. More important still the number of locks is to be reduced from twenty-six to seven. This will make it possible for a ship to pass through the canal in very much less time than at present.

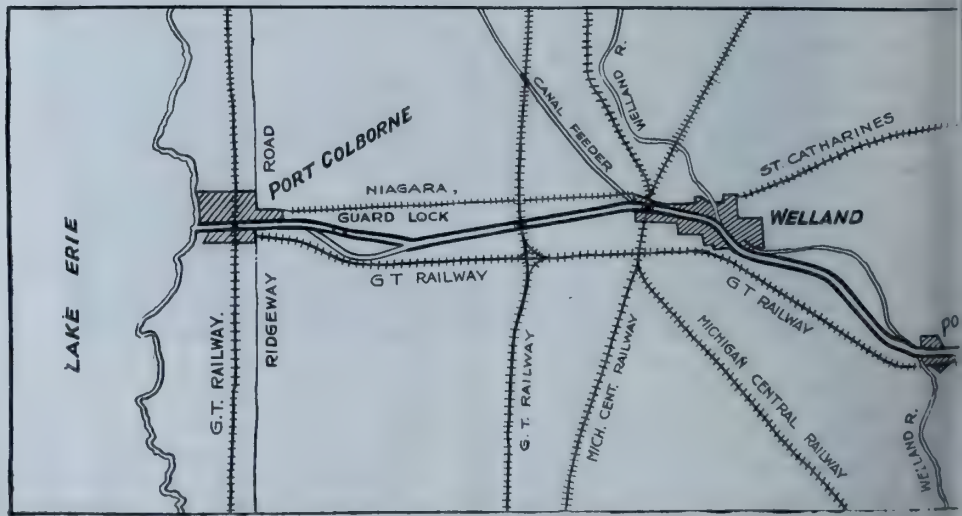
Each one of the seven locks is to be an exact duplicate of the others, except that in the case of Locks 4, 5 and 6, which form a flight, they will be double, permitting the simultaneous passage of ships up and down. As it is in the lock that the main engineering interest of a canal lies it may be helpful, as indicating the size and importance of the new Welland Ship Canal, to give some statistics about the proposed locks.



ELEVATION, SHOWING THE HIGHER LEVEL GAINED BY THE LOCKS.

Lock Statistics.

The usable length of the locks will be 800 feet, their width 80 feet. They will have a lift of 46½ feet, making the total lift of all seven, 325½ feet. By way of comparison one may note that at Sault Ste. Marie the Canadian lock is 800 feet long and 60 feet wide, with a depth of water over the sills of about 21 feet.



A PLAN OF THE DISTRICT, SHOWING THE THREE ROUTES—THE OLD CANAL,

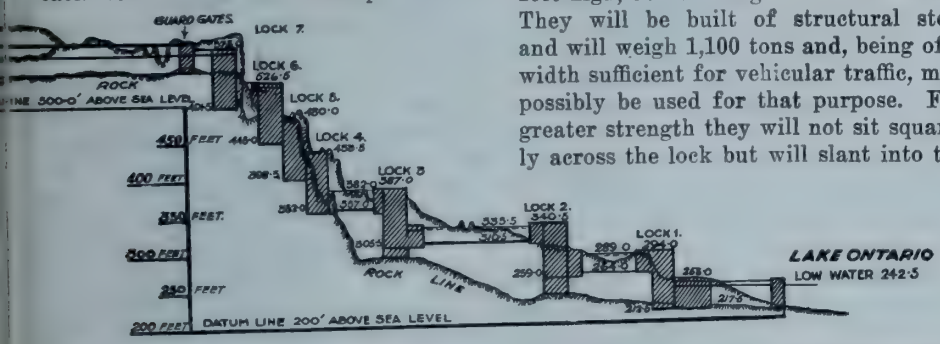
WHEN COMPLETED THE PIERS WILL EXTEND FAR OUT INTO THE LAKE, GUARDING A LARGE HARBOR.

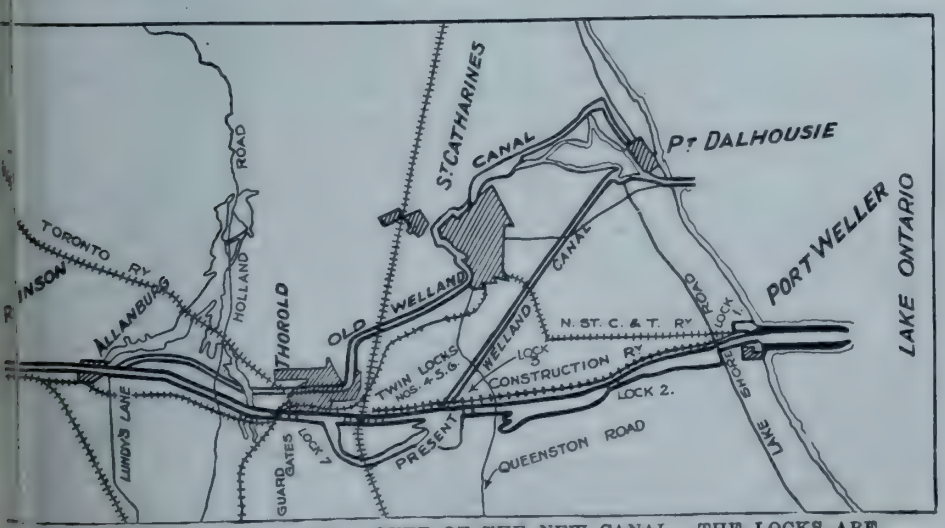
On the American side the Poe lock is 900 feet long and 100 feet wide. At Panama the locks are 1,000 feet long and 110 feet wide.

Single-Leaf Gates.

Where the new Welland locks do make a notable departure, however, is in the type of gate to be used. Hitherto it has been customary in canal work to employ double-leaf gates mitring into each other. Now an attempt will be made to prove that single-leaf gates can be used effectively. This means that instead of having two gates hinged at either side and meeting in the middle of the lock, there will be but one gate which will swing right across the lock. It is argued that such a gate, resting in a recess in either wall would form a stronger barrier and would be less liable to be wrecked than the double-leaf type.

The gates as designed are to be 85 feet high, 90 feet long and 10 feet thick. They will be built of structural steel and will weigh 1,100 tons and, being of a width sufficient for vehicular traffic, may possibly be used for that purpose. For greater strength they will not sit squarely across the lock but will slant into the opposite wall. The submerged portion of the gate will be air-tight, thus forming a floating chamber, which will relieve the pivot upon which the gate is swung of much of its weight. A chain guard above each gate will serve still further as a protection.





THE PRESENT ONE, AND THE ROUTE OF THE NEW CANAL. THE LOCKS ARE ALSO INDICATED.

The Man Behind the Work.

The man, who is behind this great undertaking, is the man whose work will be perpetuated in the name, Port Weller. John Laing Weller, the engineer who planned the new canal and who is now engaged in putting his plans into concrete form, is a Canadian by birth, having been born in Cobourg fifty-two years ago. All his life he has been interested in canal work. First on the Trent Valley System, and then on the St. Lawrence System, he had long and valuable experience. Fourteen years ago he was made superintendent of the present Welland Canal, a position he occupied for twelve years. Meanwhile he saw that the time was coming when an enlargement of the capacity of the canal was absolutely necessary. He studied the situation thoroughly, went over the ground carefully and by degrees evolved the plan for the new waterway. When the time came he was ready, and his appointment by the Government to carry out the big task was indication of their confidence in his ability.

Will Take Years.

It will take years to build this Welland Ship Canal. Even without the interference of the European War, it would have required five years to complete, but now that the war has forced retrenchment on the Government and a brake has been put on the activities of the contractors, it may drag on much longer. Still work continues, steady, deliberate and to the point, and progress will be made even under existing conditions. The need for the enlargement exists now as much as ever it did.

In a word the completion of the new canal will make navigation between Lake Erie and Lake Ontario possible for hundreds of boats which are unable to use the present canal. That waterway with its 270 foot locks and its 14 foot depth will seem a mere toy before the great 800 foot locks with their 25 feet of depth which will replace them. Again, there will be very few boats sailing the Great Lakes which will be prevented on account of excessive length or too great draught from using the canal.

CLASSIFICATION OF GREAT LAKES STEAMERS.

THROUGH the courtesy of our contemporary, "Fairplay," we are enabled to reproduce from the presidential address of H. T. Hines at the annual meeting of the Institute of London Underwriters,

an extract bearing on the Classification of Great Lakes Steamers, and also a letter from a correspondent which appeared in a recent issue of that journal dealing with the same subject. Mr. Hines in the course of his remarks said:

The heavy losses due to the storm on the Great Lakes last November have called special attention to the question of the design and construction of lake steamers, and the consideration which is now being given to the subject will no doubt result in such improvement and strengthening up as may be found to be necessary. It is much to be desired in the interests both of underwriters and owners that all lake vessels should be built to a high standard of classification, such as that of Lloyd's Register of Shipping, which has the best scientific knowledge and practical experience at its command. I venture to express the hope that in future the requirements of Lloyd's Register for lake steamers (which I understand were formulated after careful investigation of the special conditions on the lakes) may be adopted as extensively and with as satisfactory results as the requirements of that Society may have been for ocean-going steamers.

The correspondent of "Fairplay," who signs himself "Naval Architect," says:

Having had an intimate practical experience of the conditions existing on the Great Lakes of America as regards the construction and operating of freight steamers thereon, I have read with much interest the article in the Liverpool Journal of Commerce of the 20th August (reproduced in the September issue of Marine Engineering of Canada), purporting to contain the remarks made by James M. Smith, the manager of the Collingwood Shipbuilding Co., respecting the relative requirements of the Great Lakes Register and of Lloyd's Register of Shipping. Mr. Smith says he has found the requirements of the Great Lakes Register to be very complete, and the given dimensions of material very intelligently worked out. Ships built to class in this register, he says, are quite up to any requirements of British Lloyd's. There are some ships built on the lakes that are classed in Lloyd's Register; they are good ships, but they are not any better nor any stronger than the ships that are classed in the Great Lakes Register.

Before commenting on these statements let us note that Mr. Smith himself does not appear to be wholly consistent. Although he has expressed the definite sentiments quoted above, he commences his communication by this admission: "It is quite true that many of the ships built in the American shipyards of the Great Lakes are not built as strongly as Lloyd's requirements call for, and most of the latter are classed in the Great Lakes Register."

Mr. Smith may choose either of the horns of the dilemma upon which to impale himself. Either he must revise his conclusion regarding the relative merits of Lloyd's Register and the Great Lakes Register, or he convicts the latter society of assigning their highest class to vessels which are structurally weaker than their standard. As a matter of fact no one in a position to investigate this matter technically will deny that the arrangement of the materials as at present adopted in vessels trading on the Great Lakes is open to much improvement, and the material in many instances is uneconomically used. The requirements of Lloyd's Register have so altered this distribution as to obtain a considerable increase of structural strength without increasing the weight of the vessel.

There is one most important point to which Mr. Smith makes no reference, viz., the question of supervision and workmanship. The writer has had the privilege of visiting every shipyard on the Lakes, of examining the work under construction, and also of examining professionally many of the vessels which survived the storm of last November. From that examination it was clear that the quality of the workmanship and the amount and quality of the riveted attachments were, in many cases, not such as could be accepted by Lloyd's Register.

It would be difficult to exaggerate the importance of this matter having in view the type and general design of the vessel trading in these waters. It is an indisputable fact that the damage to which lake vessels are subject would be very much diminished if the supervision were of that thorough and skilled character which is exercised by the surveyors of Lloyd's Register, who are independent, and who have the one desire to produce a thoroughly efficient structure. Whatever may be the inferences drawn from the results of last November's storm, and the conditions then were no doubt exceptional, it is impossible to resist the conclusion that the adoption of the requirements of Lloyd's Register and the expert supervision of that Society would be to the advantage not only of the underwriters who assume the risks of the vessels, but of the owners and all other interests concerned in this trade. The standard of construction would thereby be raised as materially on the Great Lakes of America as has resulted from the extended operations of the Society in other parts of the world.

AMERICAN SHIPBUILDING CO.'S REPORT.

THE American Shipbuilding Co. has issued its annual report for the year ended June 30, 1914. Details of the income account are as follows:

	1913-14.
Net earnings	$712,061
Depreciation, interest, etc.	432,757
Balance	$279,304
Preferred dividends	276,500
Surplus	$ 2,804

The general balance sheet as at June 30, 1914, shows:

Assets.

	1913-14.
Plants and properties	$18,740,530
Material on hand	530.331
Stocks and bonds	1,873,209
Advances to subsidiaries	351.379
Uncompleted contracts	4,959
Cash	587,579
Accounts and notes receivable	1,484.925
Deferred c'hg's to operations	57,744
Total	$23,630,676

Liabilities.

Preferred stock	$ 7,900,000
Common stock	7,600,000
Accounts and notes payable	672,852
Accruals	68.367
Funded debt	250,000
Appreciation in real estate, buildings, etc.	1,137.481
Profit and loss surplus	5,441.235
Total	$23,630.676

In his statement to stockholders, President Smith said that "owing to the general business depression which has prevailed for the last two years, especially in the iron and steel trade, the business on the Great Lakes for the year ended June 30, 1914, has been unsatisfactory. We believe that, when the steel trade revives, business on the Great Lakes will also be much better, but, in view of the prevailing and continued depression, the directors have deemed it unwise to make any declaration of dividends for the fiscal year ended June 30, 1914, in excess of the 3½ per cent. already paid.

"The financial condition of the company is most satisfactory. During the past year its liabilities have been reduced over $2,000,000, thus putting it in excellent shape to await the revival of business. The condition of the property at the various plants has been maintained, and necessary but large expenditures have been made to change and enlarge the dry-docks, which enlargement has been requisite owing to the increased size of the vessels constructed on the lake. During the year the company built 16 vessels with a carrying capacity of 83,100 net tons."

PROGRESS IN NEW EQUIPMENT

There is Here Provided in Compact Form a Monthly Compendium of Marine Engineering Product Achievements

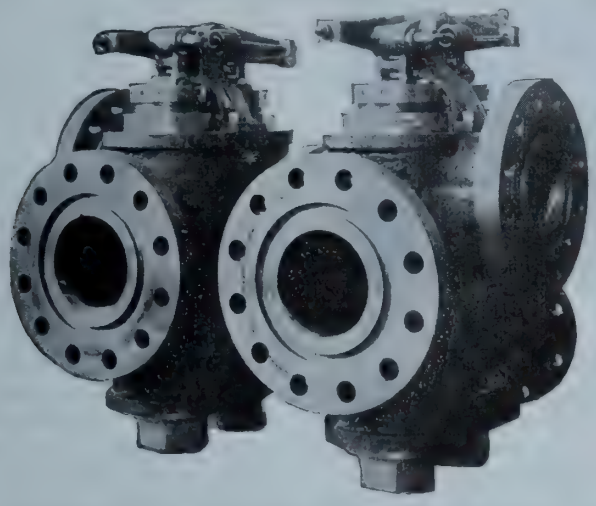
GATE PROTECTING MECHANISM. PANAMA CANAL.

MUCH has been written in papers, magazines and books about the wonders of the Panama Canal as a whole, that many of the smaller, yet remarkable and interesting details, have been overlooked. Although no new principles were involved in the construction of the canal locks, they are perhaps the most important feature of the entire canal. The locks at Gatun are not only the largest in the world, but altogether comprise the largest monolithic structure of its kind ever built, exceeding in volume the great Assouan Dam, and bulking two-thirds as large as the Great Pyramid.

Special articles have been published concerning the locks, their construction, operation and the electrical devices used. Throughout the length of the canal every precaution has been taken to guard against accident, and since the locks are naturally among the most vulnerable points, numbers of ingenious devices have been installed to guard them from all possible injury.

It is conceded that in case a vessel should get out of control in entering a lock, or should be given the wrong signal to go ahead, there is every possibility that its weight would come in contact with the gates with sufficient force to spring them to an extent which would prevent their opening; or by opening the gates, let out the water to the destruction of the vessel, by breaking its back on the lock floor. To prevent any possibility of an accident of this kind, chain fenders are stretched across the canal 100 ft. in front of each of the entering lock gates, and also in front of the guard gates at the Pacific end of the canal.

These chains are maintained in a taut position when the gates are closed, and are lowered into grooves in the bottom of the lock when the gates are opened for the passage of a ship. When a ship from the Atlantic enters the forebay at the lower end, its way will be barred by one of these chains. Interlocking electrical control mechanism prevents the lowering of the chain until the gates are opened, and after the ship has passed into the lock chamber the gates cannot be closed until the chain has been raised into position again. As the guard chain drops to the bottom of the canal, a miniature guard chain stretched across the control board will drop out of sight in a slot.



ELECTRICALLY OPERATED, STEEL HYDRAULIC VALVES.

Following the general policy of all the work done by the Government engineers on this great project, the gate protecting mechanism has been selected, designed and tested with great care, to avoid every possibility of accident or failure. Only the highest quality of material is used throughout, and an unusually high factor of safety has been demanded in all the gate fender mechanism to provide for unforeseen contingencies. The chains vary in length from 415 to 780 feet, and are made from the very highest quality of wrought iron bar, 3 inches in diameter. They are raised and lowered by a special form of hydraulic mechanism known as chain fender machines. There are two of these machines to each chain, 24 chains and 48 machines.

Chain ends are anchored in pits on either side of the lock, and the chain runs over a series of sheave wheels, which raise and lower it by means of the cylinders, plungers and valves composing the chain fender machines. The cylinders of the latter are 20 ft. long and 40 inches in diameter, and water is admitted to the cylinder through electrically operated steel hydraulic valves connected to 6-inch pipes.

Forty-six of these valves, one for each lock gate of the canal, of the pattern shown in the illustration, were built by the Nelson Valve Co., Philadelphia, for operating the chain fender machines; and, although the ordinary working pressure of the machines is to be approximately 150 lbs., the valves are constructed and tested to stand an emergency pressure of 2,500 pounds per square inch. This emergency may never arise, or it may be of frequent occurrence. It is estimated that even should a large vessel strike the chains with considerable momentum, the factor of 2,500 lbs. per square inch for the cylinders, piping and valves affected by the impact, would be sufficient for safety. The first effect of such an impact would be to raise the pressure in the machine to 750 pounds, at which point two resistance valves open and release water through small ports.

STEEL STORAGE IN SHIPYARDS.

THE convenient storage of the various classes of structural shapes and plates required for modern shipbuilding presents an unusual problem in efficient handling and transportation. In a large shipyard the storage must necessarily involve a large and constantly changing tonnage and cover a considerable area, and the material must be stocked in such a manner as to be readily accessible, this latter being a prime requisite.

The accompanying illustration shows a double-cantilever electric traveling gantry crane located in the yards of the Union Iron Works Co. at San Francisco, Cal. At the time the photograph was taken the racks were not all completed, but the general plan of storage is shown, and it will be apparent that each classification is readily accessible and without disturbing other material. The storage yard is approximately 750 feet long and 175 feet wide and is served both by railroad tracks and by the industrial tracks communicating with the adjoining fabricating shops.

This crane was built by the Shaw Elec-

tric Crane Co., of Muskegon, Mich., (Manning, Maxwell & Moore, Inc.) and the following brief description may be of interest:

Normal capacity, 3½ tons.

Lift or hook travel, 27 ft. 6 ins.

Span, center to center of rails, 33 ft.

Cantilever extension on either side, 67 ft. 6ins.

Overall length of bridge, 168 ft.

Effective cross travel of hook, 160 ft.

Hoisting speed at full load, 60 ft. per min.

STEEL STORAGE IN SHIPYARDS.

Trolley speed at full load, 300 ft. per min.

Bridge speed at full load, 400 ft. per min.

The gantry structure is carried on eight wheels with four equalizing trucks, and the clear opening between the gantry legs is 30 feet, so that large plates can be handled without swiveling or interference. All three motions are controlled from the cage, located near the center of the trolley travel where the operator has an unobstructed view of the entire storage. The plates are handled by grip-tongs and bundles of shapes by chain slings. It is reported that this crane effects a saving of eight men, but it is obvious that this statement is by no means the final measure of the economy as the saving in time is probably fully as important a factor.

THREE RIVERS FERRY STEAMER "LE PROGRES."

THE Davie Shipbuilding & Repairing Co., Levis, Que., have recently completed the ferry steamer, Le Progres, ordered of them by the corporation of the City of Three Rivers, Que. The launch, as noted in our September issue, took place on September 5, the christening ceremony being performed by Miss Brenda (Kitty) Davie in the orthodox manner. and in the presence of a goodly turn-out of spectators, notwithstanding the early hour (6.30 a.m.) for which the function was scheduled.

The vessel is built of steel to class 100 A.1. at Lloyds, while the hull has been specially strengthened for ice-breaking duty during the winter season on the St. Lawrence. Her length between perpendiculars is 126.6 feet; breadth, 34.2 feet, and depth, 12.2 feet. The propelling machinery consists of one set of compound engines having cylinders of 15 and 30 inches diameter by 22 inches stroke, and one marine type boiler 11 ft. 3 in. diameter by 9 ft. 6 in. long, of 150 pounds per sq. in. working pressure. A speed of 11½ knots with 425 indicated horse-power was registered on the official acceptance trial.

There is excellent accommodation on the ship for about 450 passengers. In addition to the main saloon, there is a handsomely decorated ladies' cabin and also a gentlemen's smoking room, while on the upper deck a spacious promenade has been arranged. The fore part of the vessel is set apart for general cargo, horses, cattle, etc.

Electric light is installed throughout and an unusually full complement of propelling machinery auxiliaries, ship deck and navigating appliances are to be noted in the vessel's furnishing and equipment. During the various official trials, the machinery worked efficiently and smoothly, and the vessel herself not only presented a trim and business-like appearance, but gave highly satisfactory evidence of same.

The building of this ferry steamer is a further mark of the enterprise being shown by the corporation of Three Rivers in developing and bringing to the notice of those looking for industrial location, the natural attractions which the geographical position of the city offers, and bears testimony as well to the skill and up-to-dateness in naval architecture and marine engineering of the Davie Shipbuilding & Repairing Co.

NEW LOCK OPENED AT THE SOO.

THE new third lock and the new canal on the American side at Sault Ste. Marie were formally opened on Oct. 21, in the presence of the engineers who built it and a party of steamboat men, representing various ports and associations of the Great Lakes. The new lock is the largest in the world, being 1,250 in length and 80 feet wide. It has a draft of 24½ feet, and will accommodate any two of the largest boats on the Great Lakes at one locking. Electricity is used to operate the huge gates, and the estimated cost of the new canal and lock is placed at a little over six million dollars.

CITY OF THREE RIVERS FERRY STEAMERS "LE PROGRES."

PRACTICAL ARTICLES BY OUR READERS

Readers are Invited to Contribute to this Department with Short Articles or Comments — We Pay for all Available Material.

COMMUTATOR AND OTHER TROUBLES.—I.

By H. C. Thomas.

CONSIDERABLE experience in the operation of direct current generators and motors has taught the writer some of the troubles which this type of machine is heir to, and the following hints are offered as a means of overcoming them.

Without question the feature demanding most attention in this class of electrical machinery is that of the brush contact with the commutator. The nicety of adjustment of the brushes which is required in most cases, especially when working at or near full load, and the occasional attention which is needed as the brushes wear, are among the most important details. The introduction of the interpole type in which an intermediate pole is placed between each pair of main poles has reduced the tendency to sparking very considerably. There are, however, many machines in use without interpoles.

Sparking.

Sparking is an evil which must be stopped at all costs, for even though it be only slight, and taking place under the surface of the brushes, the latter will rapidly burn away, and the surface of the commutator become more or less roughened. The evil will gradually become worse, and the heating and sparking that ensue will, if not attended to, rapidly ruin the commutator surface. When the commutator is in good order it should present a dark (not black) burnished appearance, and this is impossible to obtain when sparking is taking place.

If the mica insulation of the commutator has not been chosen with sufficient care by the manufacturer, and proves in operation to be harder than the copper, the latter wears away the faster of the two, leaving the mica projecting above the commutator surface, a condition which effectually prevents good contact with the brushes and consequent sparking. Harder brushes will not always meet the case and the best way to deal with it short of rebuilding the commutator with softer mica is to remove the projecting mica periodically. This may be done with the armature placed stationary between the centres of a lathe, a miniature circular saw driven by a small motor being attached to the slide rest, and the saw worked up and down over the mica between the copper segments.

Removing the Projecting Mica.

The high mica may, however, be removed satisfactorily without taking the armature from its bearings by using a thin file on edge or a narrow scraper the same width as the mica. A guide of some kind will be necessary for the scraper and can be made in the following way:—After the brushes have been lifted, take two wooden wedges of such a thickness that they can be jammed between the commutator and the brush holder with the fingers; fasten a strip of wood across the ends of the two wedges, so that altogether they form the three sides of a square; the strip will then lie parallel with the segments and act as a guide for the scraper or file when trimming down the mica. It is not advisable to go very deep; from 1-64 inch to 1-32 inch being usually sufficient. As each groove is completed move the armature, or rock the brush-holder around to the next. This method will of course be a slow job with a large commutator and may be done a part at a time as the machine can be spared from the load.

Brush Spacing.

The exact spacing of the brushes around the commutator is, of course, one of the most important points to receive attention. The usual method of counting the number of segments between the brushes can be improved upon, particularly in multipolar machines, and when as is sometimes the case in the older machines, some segments are thicker than others, the results are not the best obtainable. A better method is to measure the distance between the brushes in the following manner: Place strips of strong white paper one or two inches wide under the brushes so that they bridge over the part of the commutator lying between each adjacent pair of brushes, the point where the brush touches the paper being marked with a sharp pointed pencil. Number the strips to show their positions on the commutator, then put them together and compare them, when the necessary alterations can be made to bring the brushes all the same distance apart. For example, suppose we are working on a machine having four brush-holders, the true brush centres being 6¼ inches apart, measured along the arc of a commutator about 8 inches diameter. We will designate the brush-holders top and bottom right, and top and bottom left, and the spacing top and bottom, right and left.

If, on measuring, we found the spacing as follows, top 6 inches, right 6¼ inches, bottom 6½ inches, left 6¼ inches, we would move the top right brush-holder, and bottom right brush-older ¼ inch in a clockwise direction, and make them all equal. Try again with the paper strips and check results.

Bedding the Brushes.

When the spacing is correct, bed the brushes to the commutator by pulling a piece of sandpaper to and fro over the commutator surface with the rough side outwards, examining the brushes from time to time until you can see they are properly bedding along their whole surface. The brushes should have freedom in the brush holders, but no play; this point is of special importance when the armature has to run in either direction. If they are loose in the brush holders they will change their position with each revolution of the sandpaper, making it necessary to hold the brushes in position while being bedded, or to draw the sandpaper in one direction only; say, by securing a band of it to the commutator and revolving the armature by hand. When the bedding of the brushes is complete, clean off all carbon dust and start up, rocking the brushes into the best position for sparkless commutation. If you find this varies with the load, set the brushes at the best point for average load. Violent sparking which cannot be traced to any other cause may be due to one or more burnt out coils, which must be removed and replaced by new ones.

St. John's, Nfld.—The steamer Bonaventure, under charter to the Canadian Government, has just returned from the second of two trips this season to Port Nelson. The season's work at that port, where the Government is preparing a terminal for the Hudson Bay Railway, is practically ended and the other steamers which have carried men and materials there will leave shortly. Surveying and meteorological parties which have been studying conditions in the bay will come out on the cruiser Acadia. Work on the breakwater in the Nelson Estuary, where the Government plans to construct a safe harbor, has made considerable progress and it is expected that dredging will be begun next summer.

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Vol. IV OCTOBER, 1914 No. 10

PRINCIPAL CONTENTS.

WHOSE BUSINESS IS IT?

SINCE the outbreak of the European War, considerable effort has been expended upon and attention given to the broadcasting of trade data compiled from the immediately past records of the different belligerents, the assumption being that these latter were more or less hors de combat industrially and commercially. It was generally conceded that an opportunity presented itself, to nations not directly and those in large measure only indirectly involved, to step into the breach and secure and develop to their immediate and future profit the business that had perforce come to a standstill. As the days and weeks have sped on, it has, however, become clearly evident that the glittering opportunities have lost much of their lustre and that it is getting to be a question of long odds and a strengthening disposition against display of effort to take action thitherward.

On paper, shall we say, Canada and the United States are having the greatest business opportunities in their history presented to them, and we doubt not but all of that enterprise of which they are justly proud and for which they have been rewarded in the competitive markets of the world has been martialled to embrace and partake of each and every offering. This notwithstanding, a spirit of hesitancy to embark is evident. Little headway if any has been made in the matter of capturing trade, for although certain industries in Canada and the United States are experiencing a boom time, the condition is war contributory and not war resultant.

The overwhelming nature of this awful European Conflict has laid claim to first place in the hearts and minds of individuals, the world over, whether they be neutrals or otherwise. Men of all classes and conditions are being disposed to take stock of themselves; in a word, they feel impelled to put first things first. The tragedy of Europe is coming so close home to them as to take the snap out of their business enterprise. The happenings of the past few weeks have raised in everybody's mind the query, "Whose Business is it?" and the unanimous because only reasonable answer forthcoming is that it is the world's, individually and collectively. What has transpired and is transpiring in the war area and beyond brings the lump to the throat of every civilized and freedom-loving human being, and no artifice however skilfully originated and applied will down it.

Never before in the history of this old world has there been so general an ascription to a foundation principle of national and individual being and well-being as that brought to light since this European War began. Never before has honor been so truly enthroned because never before has such an individual appeal been made by it. This whole round earth is suffering in its every relationship because, first of all that war has been consummated and, in the second place, will suffer still more aggravatingly because of its unnecessary prolongation. This European War can and will only have one end—the world-wide overthrow of militarism and in the ups and downs which will intervene, trade and commerce will see-saw and continue to wear the garments of depression.

There is now every appearance of its being a long war, and as all of us know, although little Belgium knows more, it is already a cruel war. The end is meantime nowhere near in sight, although the nature of that end has been determined. Don't then let us swerve from the path of duty and heap adoration on ourselves by subscribing to any such play of words as give expression to the sentiment that the year 1914 will stand out in history as that in which was recorded the North American Continent's Greatest Achievement—to wit the 100 years of Peace, and Europe's Colossal Failure. No, and while giving due credit and honor to the statesmanship and good sense of the citizens of this continent, let us not forget that there is now in progress a movement which in near future years will give total eclipse to our 100 years of localized peace by the establishment of a world's peace, and that to share in this larger achievement it must now be realized of this European War that it is a world's business.

As indicated in a previous writing, we dare not be pessimists, at the same time we need not remain impotent or indifferent. This war is everybody's business in that it be prosecuted vigorously to its one and only logical conclusion, and in that the dislocation of industry, commerce, research and scientific investigation be speedily adjusted. "Whose Business is it?"

Marine News From Every Source

Quebec, Que.—The tug Muriel was sunk on Oct. 16, in the St. Lawrence in front of Madam Island, some thirty miles from Quebec, by the collier Bonaventure.

New Longueuil Ferryboat.—The new boat, Louis Philippe, of the Canadian Line, Ltd., built at Lauzon for the Longeuil ferry service, Montreal, was successfully launched on September 22.

The Grand Lake Steamship Co., Ltd., has been incorporated at Fredericton, N.B., with a capital of $20,000, to operate a line of steamers, registered at the port of St. John.

Lighthouse Service Vessel.—A new vessel for lighthouse service on the St. Lawrence from Lake Ontario to Coteau will be launched on November 9. It is the Granville, which is now under construction at the Polson Iron Works, Toronto.

Sarnia, Ont.—The steamer Howard M. Hanna, Jr., which was removed from the rocks near Point aux Barques, Lake Huron, by the Reid Wrecking Co., of Sarnia, has been sold to Canadian parties, and is now at Collingwood shipyards for repairs.

Montreal, Que.—The Harbor Commissioners of the city have decided to go ahead at once with the plans they have been considering for some time of extending at a cost of $800,000 the present No. 2 concrete elevator, situated on the river front near the foot of Jacques Cartier Square.

Sarnia, Ont.—The steamer Peck, of the Reid Wrecking Co., is now in the company's drydock at Port Huron, where some repairs are being made to underwater parts. The Peck is the boat which was purchased by the Reid Company and rebuilt at Sarnia, after her boiler had done considerable damage when it blew up in Green Bay, Wis.

St. Thomas, Ont.—As a result of the bursting of a steam pipe in the boiler room of car ferry Bessemer No. 2, early on the morning of September 24, two men were instantly killed and a third severely scalded. The accident occurred while the boat was in midlake on her way to Port Stanley, and she at once put back for Conneaut. All three men were coal passers, and belonged to Conneaut.

Victoria, B.C.—Extensive repair work is to be carried out aboard the Dominion lighthouse tender Quadra following her return to port from the west coast of Vancouver Island. In all probability the Quadra will be out of commission for at least six weeks, owing to the extent of the necessary repairs. She will be hauled out at the Victoria Machinery Depot.

Trenton, Ont.—The new signal that is being devised for the placing of pilots on the freighters that pass up and down the lake, it is said, is so arranged that each vessel in the fleet has a separate whistle code, which will be used instead of calling out the name of the steamer in the night to the shore pilot. The first call is a short, a long and a short blast, which warns the shore pilot that a boat is coming, and when the shore pilot comes near the steamer the captain will signal by the number of blasts the name of his steamer.

Victoria, B.C.—To be given a general overhaul preparatory to being placed in the winter service on the triangular run, the C. P. R. gulf ferry Princess Charlotte, Captain Griffin, has been temporarily withdrawn and docked at Esquimalt. Throughout the summer, with the exception of the daily lay-over each week for examination of her machinery, the Princess Charlotte has been operated continuously.

Ottawa, Ont.—Aids to navigation which have been established in Hudson Bay and Straits this season have greatly facilitated the passage of steamers in quick time to and from Port Nelson, according to reports which have been received at the Railway Department. A fleet of boats and tugs conveying supplies has been in operation all summer, and rapid work is being prosecuted upon the terminals at Nelson.

Sarnia, Ont.—A weather reporting station for the information of skippers on boats passing up and down the river is to be installed in the near future on the top of the new Lougheed machine shop building in this city. Mr. Harry Lougheed, manager of the company, made a proposition to the Government that if it would equip the plant, he would keep it in operation, and see that all signs of weather conditions were promptly placed on the staff, where they could be seen by sailors.

Victoria, B.C.—Having been released from the Government service as a hospital ship, the coasting steamship Prince George has been placed in drydock at Esquimalt for the purpose of having removed from her hull the marine growth accumulated during her various cruises in the naval service. The fact that the Prince George is being overhauled in dry dock indicates that it is the intention of the Grand Trunk Pacific to place her back on the northern run immediately.

Victoria, B.C.—Within ten days after being hauled out at the Yarrows' shipbuilding plant, the C. P. R. gulf ferry, Princess Victoria, which on August 26 sustained serious damage forward when in collision with the Admiral Sampson, was floated from the ways at Esquimalt on September 18. It was announced at the C. P. R. passenger offices that the Princess Victoria will resume her old schedule.

Owen Sound, Ont.—There is a proposal on foot to run a new steamship line from Owen Sound to Fort William next summer, having connection with the North Shore and Sault Ste. Marie. It is proposed to place a new passenger and freight boat on the route, which has not been covered since the advent of the C. P. R. boats, when the old Frances Smith, City of Owen Sound, Carmona, and other boats made it a regular run. An outside man is behind the scheme.

Port Dalhousie, Ont.—Muir Bros. Dry Dock Co., have made extensive repairs to their two dry docks, having put in new gates and a concrete apron in front of same with sheet piling. This has successfully cut off the leaks which kept the floor of the docks wet last summer. They are now in good shape. The dry dock gates, which the new ones replace, were hung fifty years ago, and, even after this long period of continual use, the timbers were found to be perfectly sound and the gates good except that the spaces between the timbers here and there allowed water to come through.

The Collingwood Shipbuilding Co., Collingwood, Ont., has received a contract for a Scotch type boiler from the Naval Service Department at Ottawa. It is for the coast steamer Alfreda, and is to be delivered at Halifax as quickly as possible.

Port Arthur, Ont.—It is reported that a party of American capitalists, represented by Mr. Smith, general superintendent of the American Shipbuilding Co., Cleveland, Ohio, and brother of Mr. John Smith, former general manager of the Western Dry Dock and Shipbuilding Co., Ltd., Port Arthur, have assumed control of large interests in the Port Arthur concern. The purchasers are understood to have purchased the interests of Mr. L. H. Wallace, former general manager of the Port Arthur company, and others. They are also said to be without interest in the American Shipbuilding Company, and will introduce an entirely new personnel into the directorate of the local plant.

Ottawa, Ont.—That the terminals and harbor at Port Nelson will be completed by the time that steel has been laid to the port, was the statement made by W. A. Bowden, Chief Engineers of Railways and Canals, who returned from an inspection trip there on September 21. The tug-dredge, the Port Nelson, is working in the channel at the mouth of the river. Mr. Bowden will submit a report to Hon. Frank Cochrane. His journey was made by the way of Hudson Straits, and although he met some ice on the way in, none was visible on the return route.

Soo Canal Traffic Decrease.—With a decrease of half a million tons from August, 1914, the statistical report of the September traffic through the St. Mary's Falls canals, issued on October 4. shows a decrease as compared with the corresponding month last year of two and one-half millions. For the month of September, 1913, the figures show a total tonnage of 10,910,363 and, for this year, 8,417.716. Increases are shown in flour, wheat and salt, while grain, coal and iron ore show decreases. There were nearly six hundred fewer vessels passages through this year. The Canadian canal carried through 920,454 tons more than the American side, with 996 less vessel passages. The number of passages show a decrease of 2,850.

Navigation Co. Wound Up.—The Timiskaming Navigation Co. has been wound up by an order of Justice Middleton at Osgoode Hall, Toronto. James Hardy is named interim liquidator, and a reference is directed to the Master-in-Ordinary. The company was incorporated in 1906, with its head office in Toronto. Its nominal capital stock was $99,000, of which $50,400 is subscribed and paid up. An affidavit by Thomas Jenkins, vice-president, says that the company assigned this month for the benefit of its creditors, who have many overdue claims. He adds that the company is insolvent, with overdue debts of $28,000, while the immediately realizable asets amount to only $7,000. There are other assets which cannot be realized upon at once, consisting of boats, real estate and goods.

Toronto Harbor Commission — The Harbor Commissioners have completed all the work sanctioned by the City Council but they intend to keep their dredges at work as long as possible this fall in order to facilitate the harbor work and provide employment for as many men as possible. A. C. Lewis, secretary, and Engineer E. L. Cousins of the Commission, have interviewed Mayor Hocken, and stated that they would do $100,000 worth of work yet this fall if the city would consent to it. It was also pointed out that they could do some of the city's work in connection with the construction of the bridge over the Don. This whole structure will cost about $90,000 and the preliminary work could be done by the Commission this fall. No definite action was taken but the matter will be decided shortly.

U. S. Register for Foreign Bottoms.—The Underwood Bill granting American Register to foreign-built ships that may be purchased by American citizens, or that are now owned by American corporations, for service in the foreign trade of the United States passed Congress and has been signed by President Wilson. The Panama Canal Act of 1912 permitted the granting of American Registry to foreign-built ships, not over five years old, for over-sea trade when purchased by American citizens, and this bill simply strikes out the age limit. Under it, any ship whatever may be purchased. The bill also authorizes the President to suspend the provisions of the law requiring the watch officers to be citizens of the United States. This provision is essential as an emergency measure because there are not a sufficient number of licensed officers in the United States to man the ships. Determined efforts were made in the Senate and in conference to extend coastwise privileges to the ships so admitted. In conference such a provision was actually inserted in the bill, but it was defeated after a heated debate in the Senate. It is, of course, surprising that such an amendment should have been attempted, as it would literally wreck the shipbuilding industry of the United States.

St. Lawrence Regulations.—Under the head of "Marine Notices" in the Canada Gazette there recently appeared an extract from a recent Order-in-Council prescribing that all vessels drawing less than fourteen feet of water shall, when navigating that part of the River St. Lawrence between Lanoraie and Varennes, either up or down bound, shall use the channel known as the North or Repentigny Channel, unless they require to stop at points on the ship channel, in which case that channel may be used.

Aid to Navigation.—The Dominion Marine Department has announced the establishment of a lighthouse on the west extremity of Main Duck Island, Lake Ontario. The lighthouse is an octagonal tower with sloping sides. It is of reinforced concrete construction, having a height of 80 feet from its base to the vane of the lantern, and supporting a polygonal iron lantern with red roof. The light of the third dioptric type of 100,000 candle power is displayed at an elevation of 74 ft., and shows one bright flash every ten seconds. Petroleum vapor burned under an incandescent mantle serves as illuminant. The light station is in latitude north 43 degrees 55 minutes 52 seconds, longitude west 76 degrees 38 minutes 19 seconds, and the light is visible 14 miles from all points of approach by water.

The Thor Ironworks, Ltd., launched at their yards, Toronto, this month, the steel tug Emily Stewart, which is one of two being built to the order of the Canadian Stewart Co., for work on the Toronto harbor improvements. The christening ceremony was performed by Miss Emily Stewart, daughter of A. M. Stewart, in the presence of a distinguished gathering, which included A. M. Stewart, G. G. Greist, C. F. Powers, Alex. Lewis, Mr. and Mrs. J. C. Stewart, Mr. and Mrs. Chillas, Mrs. C. P. Ellis, jun., Major Boyd Smith, Controller Church, etc. The tug is built entirely of steel to the following dimensions:—Length, 80 feet; beam, 19 ft.; depth, 10 ft.; displacement, 123 tons. The engine is of the vertical type, with single cylinder, 20 ins. x 20 ins. The boiler is of the Scotch marine type, 10 ft. diameter by 11 ft. long, while the propeller is 7 ft. 6 in. diameter. The tug is constructed with four W. T. bulkheads, steel deck and pilot house.

Quebec Marine Agency Scandal.—Action has been taken by the Marine Department in the Quebec Marine Agency scandal, where it was discovered last spring that a system of padding pay-lists had been practised for some time. Three of the officials concerned in the disclosures have been dismissed, one has resigned and the case of another still

awaits action. Messrs. Meilleux, accountant for the agency; Dube, timekeeper, and Gagnon, clerk, have been permanently relieved of office. P. E. Parent, district engineer in charge of the agency, has resigned his position, and has been succeeded by J. A. Smith, formerly assistant engineer.

Port Arthur, Ont.—Word has been received here that the Port Arthur icebreaking tug J. T. Horne, sold some time ago to the Russian Government, arrived safely at Archangel, Russia's seaport on the Arctic.

Sault Ste. Marie, Ont.—The recommended draft for the new American lock is 19 feet 8 inches at the present stage of water; for the Canadian lock it is 19 ft. 8 inches for downbound vessels and 19 feet 3 inches for upbound vessels.

Sarnia, Ont.—The Northern Navigation Co steamer Noronic is at the American shipbuilding yards in Lorain, O., where she is undergoing a few alterations. The Noronic on her return will go into winter berth in Sarnia Bay. The Government dredge is now at work dredging out a channel of sufficient depth for her to anchor in.

Sidney, N.S.—The steamer Felix, with the first cargo of Dominion Steel Corporation products for the United Kingdom, cleared from here on Oct. 12, for Liverpool. The shipment comprises wire rods, wire nails and billets, and the hope is expressed that this will be the first of a continuous shipment of "made in Sydney" products across the Atlantic.

Ottawa, Ont.—The Department of Marine and Fisheries has instituted action against the owners of the collier Lingan, which, in a collision in the St. Lawrence a few weeks ago, sunk the Government steamer Montmagny and caused the loss of fourteen lives. The damages claimed amount to $400,000 and meantime the Lingan has been seized. Meredith, Macpherson, Holden and Shaughnessy of Montreal, are acting for the Department.

Sarnia, Ont.—The only hope of vessel owners now is that storage rates will go higher and many of them are keeping their boats out only because they feel that the storage cargoes will pay better than is now indicated. Some boats have already been chartered for storage, and among the tonnage offered by owners are many barges that have been laid up all season or part of the year, indicating that owners are willing to bring out their barges, and send them to the head of the lakes, if the offerings are good enough.

C. N. R. Absorbs Steamship Line.—The agents of the Uranium Steamship Co. announced on October 17 that owing to the war in Europe the services between New York and Rotterdam by their steamships had been suspended indefinitely, and, therefore, the offices at 13 Broadway have been closed. The steamships Uranium, Principello and Campanello have been taken over by the owners, the Canadian Northern Railway, and are now operating between Montreal and Bristol, England. The Volturno, which was burned in mid-ocean on October 10, 1913, with great loss of life, belonged to the Uranium Line.

G. T. P. Steamer Prince Albert.—The contract for the repair of the Grand Trunk Pacific steamer Prince Albert has been awarded to the Wallace Shipyards, of North Vancouver. Many tenders were submitted by Victoria, Vancouver, Seattle and San Francisco ship-repairing firms, but the North Vancouver concern was considered the most favorable. This is the biggest repair contract yet undertaken by the Wallace Shipyards, which has guaranteed to deliver the ship in seaworthy shape within forty days. Some sixty shell plates have to be replaced, and the stem bar and stern frame need considerable attention. The Prince Albert was damaged on August 18 at Triple Point, Brown Passage, and was abandoned by the owners, the G. T. P., to the underwriters. She was floated by the B. C. Salvage Co., and her salvage is regarded as a clever piece of work.

Montreal, Que.—The Canada Steamship liner Quebec was poked in the portside, between the bow and the paddlebox, above the water line, early in the morning of October 11, by the river barge H. W. Dwyer, while the latter was at anchor in Lake St. Peter. The steamer, on her way from Quebec to Montreal with passengers, was trying to clear the barge in the dark when the latter backed into her. The damage was slight. The Quebec arrived in Montreal under her own steam, then went to Sorel for repairs.

New Regulations for St. Lawrence.—New regulations governing the movement of vessels in the St. Lawrence will be put into operation at the opening of navigation next season as a result of the recommendations made by the commission which enquired into the sinking of the Empress of Ireland recently. The change which will be made will be as regards the taking on and dropping of pilots by ingoing and outward bound vessels. The practice in the past has been that inward bound ships take on pilots and outward bound ones drop them at Father Point. As a result of the Empress disaster, however, this is considered a dangerous practice. Consequently at the opening of navigation next season new rules will be put into effect which will provide that the places for taking on and dropping pilots in the St. Lawrence be four or five miles apart. This is not being done immediately, as it was considered inadvisable to change conditions in the middle of the navigation season.

Canadian Marine Directory.—A work of considerable interest to the shipping world has been issued by the Marine Department, in the form of a new directory of Canadian ports and harbors.

The last directory of this kind, compiled half a dozen years ago, is now out of date. The new volume is much more comprehensive, containing information about the principal harbors as well as a great number of the minor harbors or ports.

The maritime ports on the Atlantic and Pacific have been described, and detailed information given regarding inland navigation in British Columbia waters, navigable distances of certain lakes and rivers in New Ontario, Manitoba, Saskatchewan, Alberta, and the MacKenzie River, Yukon Territory, Hudson Bay and Straits, and Ports Nelson and Churchill.

The first port directory was confined to descriptions of harbors where not less than 50,000 tons of shipping had entered annually.

MACHINERY EQUIPMENT REQUIRED.

The British Construction Co., Dock Works, Sault Ste. Marie, Ont., with head offices at 39 Victoria St., Westminster, S.W., advise that the undermentioned machinery equipment is required for the permanent plant at Sault Ste. Marie. Subscribers to and advertisers in Marine Engineering of Canada have had their attention drawn from time to time to the establishment of a large modern drydock, shipbuilding and ship-repairing plant there, work on which is now in progress. In view of the fact that the structural feature of such an undertaking involves the lapse of some considerable time before the installation of equipment can take place, actual purchase of the various units enumerated will not take place until next year.

FLOATING CAISSON FOR DRY DOCK.

Length on top, 85 ft.; on bottom, 77 ft., with sluices, valves, etc.

CHAINS FOR MARINE RAILWAY, ETC.

Of best re-worked iron of about 53,000 T.S. per sq. in. A reduction of area of 40% and an elongation of 25% in 15 inches.

SHEARLEGS.

1—Pair shearlegs (75 ton), with electrically operated engine.

MARINE RAILWAY.

1—Crab, electrically operated, capable of hauling a vessel displacing 1,300 tons (2,000 lbs.), up an incline of 1 in 20 in about 18 minutes. Length of cradle, 230 feet.

ASSOCIATION AND PERSONAL

A Monthly Record of Current Association News and of Individuals Who Have Been More or Less Prominent in Marine Circles

J. W. Norcross, managing director of Canada Steamship Lines, Ltd., is on a trip to Chicago and Winnipeg.

M. E. Farr, president and treasurer of the Detroit Shipbuilding Co., has been elected vice-president of the American Shipbuilding Co.

Captain Samuel H. Burnham, one of the best known marine men on the Great Lakes, died in Port Huron, Mich., on Oct. 2, in his 77th year.

Capt. J A. Vibert, a former deputy port warden at Montreal, died in that city on October 1, aged 87. He retired from service 14 years ago.

J. A. Heritage, formerly chief engineer of the Princess Charlotte, is now at Dumbarton, Scotland, standing by the steamer Princess Margaret, which is nearing the steam trial stage.

Capt. Charles T. Warner died on Sept. 20, at Plympton, near Digby, N.S. The deceased, who was 79 years of age, was one of the largest vessel owners and shippers in that port of the Province, and also carried on a large mercantile business.

James Wallace, chief engineer of the C. P. R. steamer Princess Victoria, has left for Dumbarton, Scotland, where he will watch the installation of the machinery aboard the new C. P. R. steamship Princess Irene. Mr. Wallace will remain on the Clyde until the Princess Irene is completed, when he will come out with her as chief engineer.

Captain Philip Farrington, of Cherry Valley, Picton, Ont., died Saturday, Oct. 24, aged 84 years. The deceased was born in the township of South Marysburg, Price Edward County, and had from early life been sailing on the lakes, and was well known at all Lake Ontario ports. At one time he was master of the steamer Empress of India (afterwards called the Argyle), and was also for a time on one of the ferry boats running from Toronto to the Island. His last service was on the steamer Ella Ross.

LICENSED PILOTS.

River St. Lawrence.—Captain Walter Collins, 43 Main Street, Kingston, Ont.; Captain M. McDonald, River Hotel, Kingston, Ont.; Captain Charles J. Martin, 13 Balaclava Street, Kingston, Ont.; Captain T. J. Murphy, 11 William Street, Kingston, Ont.

River St. Lawrence, Bay of Quinte, Murray Canal.—Captain James Murray, 106 Clergy Street, Kingston, Ont.; Capt. James H. Martin, 259 Johnston Street, Kingston, Ont.; John Corkery, 17 Rideau Street, Kingston, Ont.; Captain Daniel H. Mills, 272 University Avenue, Kingston, Ont.

ASSOCIATIONS

DOMINION MARINE ASSOCIATION.
President — L. C. Henderson, Montreal.
Counsel—F. King, Kingston, Ont.

GREAT LAKES AND ST. LAWRENCE RIVER RATE COMMITTEE.
Chairman—W. F. Herman, Cleveland, Ohio.
Secretary—Jas. Morrison, Montreal.

INTERNATIONAL WATER LINES PASSENGER ASSOCIATION.
President—O. H. Taylor, New York.
Secretary—M. R. Nelson, 1184 Broadway, New York.

THE SHIPPING FEDERATION OF CANADA
President—Andrew A. Allan, Montreal; **Manager and Secretary**—T. Robb, 218 Board of Trade, Montreal; **Treasurer, J. R. Binning,** Montreal.

GRAND COUNCIL, N.A.M.E. OFFICERS.
L. B. Cronk, Windsor, Ont., Grand President.
A. F. Hamelin, Montreal, Que., Grand Vice-President.
Neil J. Morrison, P. O. Box 238, St. John, N.B., Grand Secretary-Treasurer.
E. Read, Vancouver, B.C., Grand Conductor.
A. J. Ross, Halifax, N.S., Grand Doorkeeper.
James Gillie and A. E. Kennedy, Kingston, Ont., Grand Auditors.

J. C. Wallace. the leading figure in the development of the American Shipbuilding Co. since its organization, tendered his resignation as president at a meeting of the board of directors on September 23. He was manager of the Cleveland Shipbuilding Co. when that concern was absorbed in 1899 by the American Shipbuilding Co.

New Harbor Commissioner.—Word has been received from Ottawa that John Laxton of Parkdale, has been appointed to succeed Ald. F. S. Spence as the Dominion Government's representative on the Toronto Harbor Board. Ald. Spence has been a most energetic member of the Harbor Board since its inception, and was largely instrumental in carrying to fruition the extensive plans for improvement now under way.

CANADIAN SHIP SUBSIDIES.

IN an article contributed to the Consular and Trade Reports, Consul General R. E. Mansfield, Vancouver, British Columbia, says that in subsidies to steamships in 1914 the Canadian Government will pay $2,238,600. For this sum, the mails are carried free and freight and passenger service maintained on the ocean and coast routes for the development of foreign and domestic trade. On the Pacific there are several ocean-service contracts, chief of which is that between Vancouver, and Hong-Kong, China, with calls both ways at Yokohama, Japan. This service is performed by the Canadian Pacific Steamship Co., the yearly subsidy being $225,000, of which Canada pays $125,000 and Great Britain $100,000. A subsidy of $180,000 yearly is paid for a monthly service between Vancouver and Auckland, New Zealand.

Directory of Subordinate Councils for 1914.

Name.	No.	President.	Address.	Secretary.	Address.
Toronto,	1	Chas. M. Arnott,	94 Hanley Street,	A. J. Fisher,	641 Bathurst St., Toronto.
St. John,	2	Wilmot Pitt	Indiantown, P. O.,	G. T. G. Blewett,	36 Murray St., St. John, N.B.
Collingwood,	3	W. T. Rennie,	Collingwood,	Robert McQuade,	P. O. Box 97, Collingwood.
Kingston,	4	S. M. Murray,	20 Rideau St.,	James Gillie,	101 Clergy St., Kingston, Ont.
Montreal,	5	A. F. Hamelin,	3210 Le Tang Street,	O. L. Marchand,	2378 Clark St., St. Vincent de Paul, P.Q.
Victoria,	6	John E. Jeffcott,	Esquimault.	Peter Gordon,	808 Blanchard St., Victoria, B.C.
Vancouver,	7	Andrew T. Roy,	3812 18th Ave., W.,	E. Read.	Room 8, Jones Bldg., Vancouver, B.C.
Levis,	8	Michael Latulippe,	Lauzon,	S. G. Guenard,	Bienville, Levis, P.Q.
Sorel,	9	John Matte.	Sorel.	Al. Charbonneau,	P. O. Box 132, Sorel, P.Qa.
Owen Sound,	10	Wallace Robertson,	1030 4th Ave. West,	James Nicoll,	714 4th Ave., Owen Sound, Ont.
Windsor,	11	Alex. McDonald,	28 Crawford Ave.	Neil Maitland,	221 London St., W., Windsor, Ont.
Midland,	12	Jos. Silverthorne,	Midland,	Jno. A. Murphy,	Midland, Ont.
Halifax,	13	Robt. Blair,	29 Preston Street,	Chas. E. Pearce,	Portland St., Dartmouth, N.S.
Sault Ste. Marie	14	A. E. Lewis.	Box 563, Soo, Ont.,	Geo. S. Biggar,	43 Grosvenor Ave., Sault Ste Marie.
Charlottetown,	15	J. F. McGuigan,	38 Queen Street.	Lem Winchester,	302 Fitzroy St., Charlottetown, P.E.I.
Twin City,	16	Wm. Faloona,	392 Ambrose Street,	Lloyd Williams.	142 Secord St., Fort William, Ont.

The advertiser would like to know where you saw his advertisement—tell him.

STORY OF BRITAIN'S LIGHT-HOUSES.—III*.

By M. W. Roberts.

THE present article, being the third of the series appearing in our columns, will be found full of interest to mariners, including, as it does, within its scope, details of the first attempt to install a lighthouse on the treacherous Eddystone rocks situated 14 miles S.S.W. of Plymouth.

The "Seven Stones" Reef.

About 16 miles north-west of Lands End, in one of the busiest spots of the ocean's highway, lies a very dangerous reef of rocks known as the Seven Stones. A lightship is anchored in 40 fathoms, the nearest port being Penzance, and the nearest land St. Martins, Scilly Isles, distant 13 miles. The captain remains on board one month and is ashore the next, when the mate takes charge in his absence, the remainder of the crew remaining afloat for two months. During the night there are always two men on duty, one to look after the lamps, the other to do deck duty, whilst the officer in the watch inspects the light every four hours. A siren foghorn is used during fog, and for vessels seen approaching the shore dangerously close, a gun is fired to warn those on board that they are standing in to danger.

The relief tender Mermaid, belonging to Trinity House, proceeds out on the 15th of each month, weather permitting, for the purpose of relieving the crew. You can quite understand with what joy they sight the signal which is hoisted by the tender to let them know that they are going to be relieved, after being tossed about for two weary months. Sometimes a fortnight or three weeks longer elapses, owing to bad weather, before they are able to effect a relief.

During a heavy S.S.W. gale, the wind suddenly shifted round to the N.N.W., causing a heavy sea to get up. One of these seas broke aboard, bursting into the bulwarks, and shifting the small boat, jamming the mate between the boat and ventilator, tearing a piece of his thigh off, others of the crew receiving cuts and bruises about the face and body, whilst trying to veer out more cable, which is done by attaching a thick grass rope hawser on to the cable, so that the ship will ride easier. Her anchor weighs about three tons and rides to about about 260 or 280 fathoms of cable, of which there are three, the links being 1⅝ in. thick.

On another morning they, the crew of the lightship, observed an object which turned out to be a ship's lifeboat with eight men clinging to the bottom. It belonged to a vessel called the Brighouse which had struck the stones, and the men had been in the water from 4 a.m. The boat was settling down, and the engineer was in the water, being supported by another of the crew, the whole of whom were too exhausted to pull them in. The lightship crew went to their assistance, and got the whole of the eight men into the small boat, but this brought their boat so low in the water that the gunwale was only six inches above the surface of the sea.

The "Wolf Rock" Light.

The Wolf Rock lies about eight miles off the Lands End in the fairway between the Scilly Isles and the main land. The cluster of rocks is exposed to the full fury of the Atlantic gales. It was one of the most attractive spots for the Cornish wreckers, for it does not take long for a vessel to get out of position around this spot during foggy weather; it is also greatly feared during heavy gales. There is a cave in one of the rocks into which the water is driven and rebounds in doing so. The air is compressed within, and as it escapes it produces a long distinct wail, resembling the howl of a wolf. It was this that gave the rock its name, "The Wolf."

The Wolf Rock would, however, have been howling until to-day had it not been for the inhuman action of the Cornish wreckers. They detested the noise as much as the mariner welcomed it, for it was always a guide to a sailor to hear it, but the wreckers filled it up and so more vessels got into trouble, and the wreckers met with a still further spell of prosperity.

The relief in the winter of 1913 was overdue by eight weeks, and about ten days after same was effected, the head keeper whilst clearing the landing place was carried off by a huge wave and drowned in sight of his comrades who were powerless to render any help. On another occasion since the above occurrence, one of the keepers, a young man named Works, who belonged to Holyhead, went outside of the lighthouse to secure some of the gear around the derrick, when one of these unlucky seas came and washed him off the rock and he was drowned. The Wolf took eight years to build and was completed on July 19th, 1869; its height was 135 feet. During the period 296 landings were effected, 1,804 hours of labor expended, or less than one hour per day of the years occupied in building it. The lighthouse cost £62,726, nearly twice as much as the Bishop Rock.

The Longships are about half a mile from Lands End, the very toe of England. The name suggests a lightship, and strangers are surprised to find it a handsome building.

The First Eddystone.

The first Eddystone was constructed as far back as 1696, by Winstanley, an Essex gentleman who was fond of mechanics, and was moved to undertake this great work by the reason of the many wrecks that occurred there. The Eddystone rocks are a dangerous group of black and jagged gneiss rocks, submerged daily by the tide, and situated some 14 miles S.S.W. off Plymouth.

The manner of his working was briefly as follows:—In the first summer he fixed a dozen iron stanchions into the largest rock which gave him a footing, so to speak, on the rock. The next year he built a pillar of stone around the stanchions some 12 feet high. In the following year he added to the diameter of the pillar making it 16 feet, and on this stone base a dozen feet high by 16 broad, he erected a tower of timber and masonry. A light was shone from its lantern in November, 1698. The next year he strengthened and enlarged it. It was four seasons building and was needlessly elaborate and unsuitably ornamental, having open galleries and unnecessary projection.

Winstanley is entitled to great credit for his effort, he believed that it was sufficiently strong to withstand the greatest sea that swept and dashed against the jagged Eddystone, and it was said that he expressed his desire to be there in the greatest storm that ever blew. It was swept away on the 20th of November, 1703, whilst some repairs were being done under supervision of Winstanley himself, and he and his workmen perished in the catastrophe. His wish had been gratified, but his tower had fallen, not a vestige was left, except a chain and a few stanchions of iron. Thus ended the first Eddystone.

*From a recent lecture on the subject.
**Chairman Liverpool Pilots' Association.

Sarnia, Ont.—Establishment of an unattended light on the south extremity of Bay Point, Sarnia, St. Clair River, has been announced by the Department of Marine and Fisheries of Canada. The light is shown from a lens lantern at a height of sixteen feet above the water, and is attached to a white wooden pole eighteen feet high, with a white shed at its base. It is illuminated by acetylene and is invisible one mile from all points of approach by water. The light is white, showing one-half second, with eclipses of three-fourths seconds and two and one-fourth seconds, alternating. Its position is latitude north, 42 degrees 59 minutes 5 seconds, longitude west 82 degrees 45 minutes and 7 seconds.

War Grist.—A contribution just received by the Naval Service Department is the gift of $2,500, worth of ship bottom composition paint for the use of the Canadian navy. The Martin-Senour Co. of Montreal, are the donors. The paint referred to is the only one of its kind manufactured in the Dominion, and will prove a very useful donation.

Insurance & Professional DIRECTORY

CIRCULATES IN EVERY PROVINCE OF CANADA AND ABROAD

MARINE ENGINEERING of Canada

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Description of Canadian Customs Cruiser "Margaret"

It will be easily apparent from a careful study of the accompanying article that neither expense, nor the ingenuity and handicraft of the marine engineer and naval architect in their most up-to-date practice have been lacking in producing this vessel for her particular service.—Data, courtesy of "Engineering."

THE cruiser Margaret, built to the order of the Canadian Customs Department by John I. Thornycroft & Co., Southampton, Eng., is designed for Customs patrol service on the Atlantic coast. During construction she was under the inspection of Frank L. Warren, M.I.N.A., M.I. Mech. E., of London. The Margaret arrived in Halifax, N.S., in April of this year. As will be seen from Fig. 1, she has a ram stem and cruiser stern, and presents a very attractive appearance. Her length over all is 200 ft., and between perpendiculars, 185 ft. The moulded breadth is 32 ft., and the depth 16 ft. The draught is limited to 10 ft., 6 in., when carrying a load of 175 tons. The vessel is largely intended for service in the vicinity of ice, and a double bottom is fitted under the engines and hold forward. The hull is stiffened to resist ice, and the shafting is housed in the hull for the whole of its length.

The vessel is very completely fitted up. There is a wireless-telegraphy outfit and an electric installation which, in addition to furnishing general lighting and power for the wireless outfit, supplies current for a 24-in. projection searchlight, fitted in the crow's nest on the fore-mast. The searchlight is of 25,000 candle power and is controlled in all its movements by electric power operated from the wheel-house. Alternative hand-control from the crow's nest is arranged for. A refrigerating plant is installed forward, and consists of two CO_2 machines by J. & E. Hall & Co., ice-moulds, cooled drinking-water tanks and store-rooms.

The vessel is heated by steam throughout, steam being taken from either of the two boilers, and reduced to 25 lbs. per sq. in. by a reducing valve. In view of the severe climate, a large heating surface—viz., 2½ sq. ft. per 100 cub- ft., has been allowed for each radiator and coil. Steam coils are fitted to water-tanks where the latter are exposed to the weather. Steam water-heaters are fitted to all baths, pantries and galley. Those for the baths are of Shanks' pattern, using salt and fresh water; others are of the Watsonia pattern. The radiators in the captain's quarters, state-rooms, saloon and chief engineer's cabin, consist of copper coils in brass casings. Other radiators are of the Walworth pattern.

On the forecastle deck there are two 6-pounder quick-firing guns of Vickers' type. They have telescopic sights, and can be seen in Figs. 1 and 2.

The system of pumping has been carefully arranged, steam suctions being led to each water-tight compartment, and each bunker and ballast-tank. These places can also be pumped out by means of a 6-in. Admiralty-type Downton pump placed on the upper deck. The latter pump can also be used in connection with the fire, wash-deck and sanitary services. The sanitary service is normally supplied by a main leading from a steam-pump in the engine-room, which keeps up a constant pressure of 40-lbs. per sq. in. on the main. A sanitary tank is fitted on top of the bridge-house for use when the steam pump is not running. This tank is filled off the main or by the Downton pump. A fire-main is run un-

FIG. 1. CANADIAN GOVERNMENT CUSTOMS CRUISER "MARGARET."

der the upper deck, with rising mains in convenient positions, all fore and aft. These are fitted for 2-in. hose with Nunan & Stove's connections. The main, which is also used for wash-deck service, is supplied from a steam pump in the engine-room at 100 lb. per sq. in. Provision is also made for working this main from the Downton pump.

ated from the upper deck. There is one horizontal door to each tunnel in the after engine-room bulkhead, and one vertical door to the passage-way through the cross-bunker fitted in the fore engine-room bulkhead. There is also a vertical bunker door to each side bunker.

The Margaret is rigged as a fore-and-aft schooner, having two pole-masts, the lower part of each mast being of steel and the topmasts of wood. A gaff is fitted on the main mast for signalling and for carrying the main try-sail, and a small signalling-yard to the foremast. The aerials for wireless telegraphy are carried at the top of, and between, the masts, as shown in Figs. 1 and 2. The foremast is fitted with a stay-sail, and the main-mast with a stay-sail and try-sail for use in case of emergency.

carvel built, of selected yellow pine, the lifeboat being fitted to Board of Trade requirements. All boats are fitted with Mill's disengaging gear, and are stowed, under davits, on chocks on the boat-deck. There is a Clarke-Chapman steam boat-hoist on the boat-deck. It is reversible, has two cylinders 8 in. in diameter by 12 in. stroke, and is capable of lifting

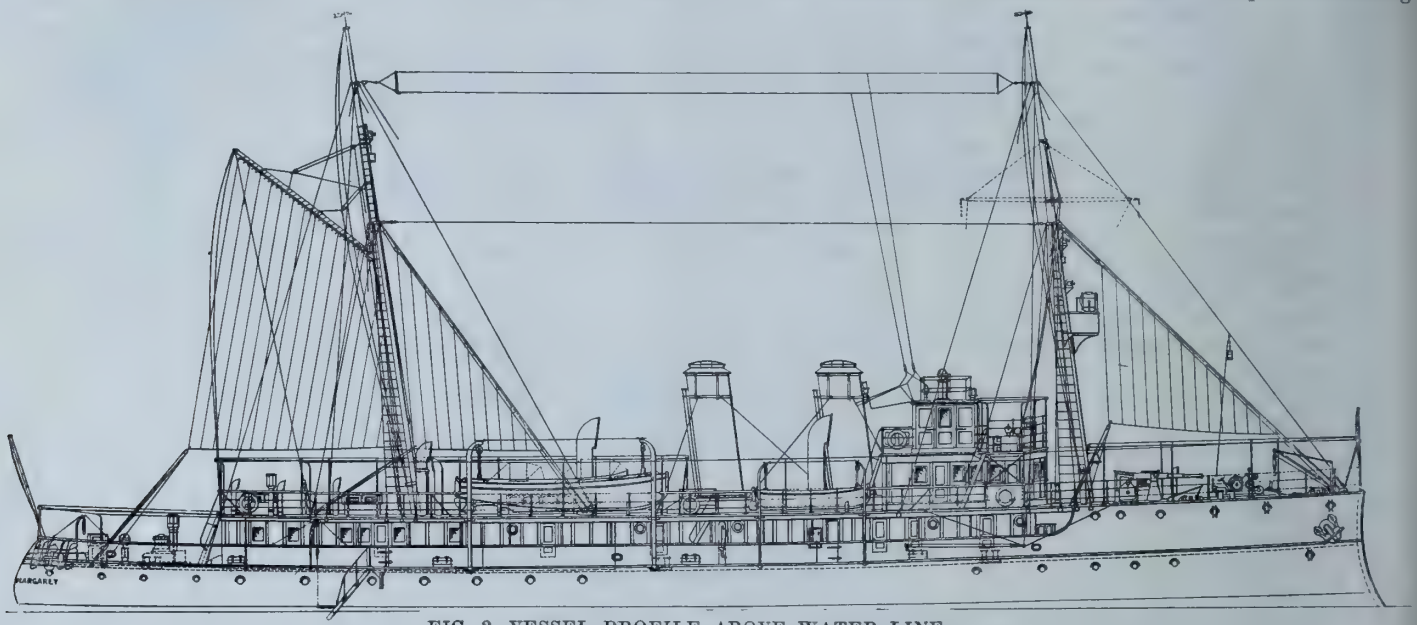


FIG. 2. VESSEL PROFILE ABOVE WATER LINE.

The fresh-water service is carried out in the same manner as the sanitary service, except that the pressure on the main is 30 lbs. per sq. in. A service tank is placed close to the sanitary tank for use when steam is not available. A 3-in. hand lift and force pump is fitted near the galley for filling the fresh-water tank by hand when necessary. Two large fresh-water tanks are provided below the lower deck. The forward one holds 4,000 gallons and that aft 6,300 gallons. A reserve feed-tank arranged in the double bottom under the engines contains 5,000 gallons of fresh water. A sea-valve is fitted for flooding the magazine in case

The outfit of boats consists of a 30-ft. motor-launch, a 26-ft. lifeboat, a 22-ft. captain's cutter, and a 16-ft. dinghy. The motor-boat is built on the double-skin system, each thickness being of mahog-

$2\frac{1}{2}$ tons at 120 ft. per minute when working with steam at 90 lbs. pressure per sq. in.

Steering is by means of a balanced rudder, having a cast-steel frame. Screw steering-gear is fitted directly on to the rudder-head. It has two 6-in. cylinders, and is operated on the right and left-hand screw principle. The steam steering-engine is placed just forward of the rudder-head. It has two cylinders 6 in. in diameter by 5-in. stroke. Control gear is led to steering pedestals fitted one in the wheel-house and one on the bridge above. Control shafting is of steel with machine-cut bevel wheels. Stand-by

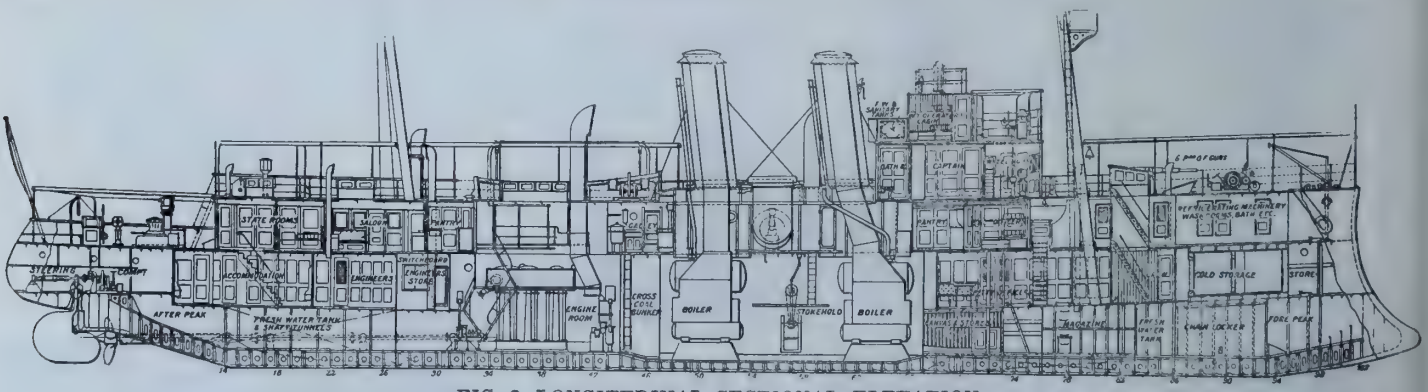


FIG. 3. LONGITUDINAL SECTIONAL ELEVATION.

of fire. It is worked from the upper deck.

The vessel is well provided with water-tight bulkheads, the bunkers being made oil-tight also. Sliding water-tight doors of quick-closing type are fitted, all oper-

any, and is fitted with a standard Thornycroft petrol-motor with four cylinders $4\frac{1}{2}$ ins. in diameter by 6 ins. stroke. The engine is of about 37 brake horse-power, and gives the boat a speed of 10 knots. The remaining boats are

hand-steering gear is fitted on the upper deck above the steering compartment. It is connected to the gear below by bevel-gearing, and a clutch arranged for throwing in or out of connection as may be required. The whole of this gear was

supplied by J. Hastie & Co., Greenock, Scotland. A steam and hand capstan is fitted at the after end of the upper deck for warping purposes, and is capable of giving a dead pull of 6¼ tons at a speed of 80 ft. per minute when supplied with steam at 90 lb. per sq. in. On the forecastle deck forward there is a horizontal steam and hand-windlass capable of working the ship's 1 5-16-in. cables, and giving a dead pull of 6¼ tons at a speed of 120 ft. per minute with steam at 90 lbs. pressure per sq. inch. Both these gears were made by Harfield & Co.

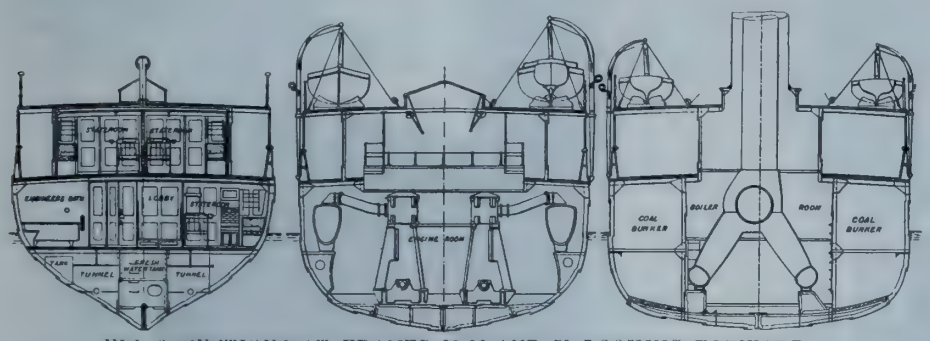


FIG. 3. SECTIONS AT FRAMES 20-36 AND 52 LOOKING FORWARD.

Officers and Crew Accommodation.

On the bridge there is a teak house consisting of the wireless operator's cabin and wireless office, and on the boat-deck a steel house, which contains the wheelhouse and the captain's accommodation. The captain's day cabin is panelled and moulded in polished mahogany and the sleeping cabin is yellow pine, enamelled white. On the main forecastle deck are arranged lavatories for the officers and crew, lamp-room, carpenters' shop, etc. A hot and cold water system is led to the lavatories. The officers' quarters are in the main deck-house forward. There is a mess room, panelled in pitch-pine, on the port side, and a pantry and the first and second officers' cabins on the starboard. The main galley is situated at the after end of the boiler casing, and is fitted with a large range, grill-hot closet, bain-maries, etc. The floor is tiled.

The aft deck-house forms the main entrance to the engine-room, and at the fore end encloses a gallery around the engine tops. Aft of the engine casing there is a steward's cabin on the port side and a pantry on the starboard side. The main saloon is situated aft of these quarters. It is panelled in polished mahogany, with overheads enameled white. The furniture is of mahogany, and upholstered in morocco leather. Leading from the saloon there are two main stations panelled in yellow pine and enamelled white. Cabins are fitted with electric bells and fans.

The accommodation on the lower deck aft comprises two state-rooms on the starboard side, fitted similar to those on the upper deck, and bath-rooms, etc., on the port side, fitted with Shank's appliances. The floors are tiled. Alongside there is similar accommodation for the engineers. The engineers' quarters are at the fore end of the lower deck aft, with entrance from the engine-room. The cabins are in yellow pine, enamelled white, with mahogany furniture upholstered in railway cloth. Accommodation for the petty officers and crew is provided on the lower deck forward. There are four double-berthed cabins, panelled in yellow pine, enamelled white, and a large mess-room in the centre. The seamen's quarters are on the port side, and the firemen's on the starboard at the forward end. Hoskins' patent berths and the necessary lockers are fitted in each case. The quarters are lined with yellow pine, painted white.

C.P.R. LINER "METAGAMA" LAUNCHED.

THE C.P.R. Atlantic liner Metagama, sister ship to the Missanabie, was successfully launched on November 19 from the shipyard of Barclay Curle & Co. at Glasgow. Lady Biles, wife of Sir John Harvard Biles, performed the christening ceremony. When the Metagama went down the ways she created a record which bids fair to remain unbroken by any shipping company engaged in Canadian or American business. She is the fourth vessel launched for the C. P. R. on the Clyde this year. In the light of present conditions this is a glowing commentary on the substantial condition of her owners' exchequer.

The Metagama's sister ship, the Missanabie, reached Montreal recently on her second voyage out of Liverpool. They are of the "one class" type, with passenger accommodation for 520 second and 1,200 third class. Each has a length of 520 feet and a greatest beam of 64 feet, while the breadth of the passenger decks are 41 feet.

Each vessel has a dead weight capacity of 7,950 tons, with an approximate cargo capacity of 6,000 tons. The cruiser stern is also a feature of the new boats.

BRITISH WARSHIP BUILDING.

THE Press Bureau of the German Imperial Marine Office has sent a circular to the press, stating that it is not in the interests of the country to give any information regarding the doing at German shipyards. Why this sudden modesty? Perhaps there are few, if any, "doings" to record. We know that there is still a vague idea that the German navy has been nursed to allow her fleet to be strengthened by the new ships she would be able to pass out to sea. As a matter of fact, the exact contrary is the case. Since the war opened, Great Britain has commissioned and prepared for sea the following vessels:

Four battleships of the Dreadnought class—the Agincourt, of 27,500 tons; the Benbow, 25,000 tons; the Emperor of India, 25,000 tons; and the Erin, 23,000 tons. These vessels embody all the latest offensive and defensive powers, and mount an aggregate of thirty 13.5 guns, throwing a 1,400 lb. projectile; fourteen 12-in. guns, using an 850 lb. projectile, and sixty 6-in. guns.

One battle cruiser of the Dreadnought type—the Tiger. This vessel of 28,000 tons, carries eight 13-in. and twelve 6-in. guns, thus raising the aggregate number of new battle guns to sixty-two, with seventy-four 6-in. guns. She has a speed of about 30 knots.

Three armored cruisers—the Arethusa, Aurora and Undaunted. These vessels displace 3,750 tons, have a speed of 29 knots, and each mounts two 6-in. and eight 4-in. guns.

Two flotilla leaders—the Brooke and Faulkner. These very big destroyers have a displacement of 1,600 tons, a speed of 31 knots and, carry six 4-in. guns, in addition to three torpedo tubes.

Eight large destroyers—the Lance, Laverock, Leonidas, Look-out, Lucifer, Meteor, Minos and Miranada. The vessels of the "L" class displace about 1,000 tons, have a speed of 32 knots, carry three 4-in. guns, and have four tubes for discharging the 21-in. torpedo. The craft of the "M" class, of which ten others are completing, according to the August Navy List, are larger, displacing 1,200 to 1,350 tons, and having four 4-in. guns, besides four torpedo tubes. Their speed is about 34 knots. Germany has no comparable resources.

Three years ago—that is, in 1911-12—Germany laid down four Dreadnoughts. We laid down five, raised to seven by the purchase of the two Turkish ships. Two years ago Germany began two light cruisers; we began eight. One year ago we decided to build sixteen destroyers—raised to eighteen by the flotilla leaders from Chili. Germany, so far as we know, appears to have five or six craft in hand, and usually takes 12 to 15 months to build them.—Page's Weekly.

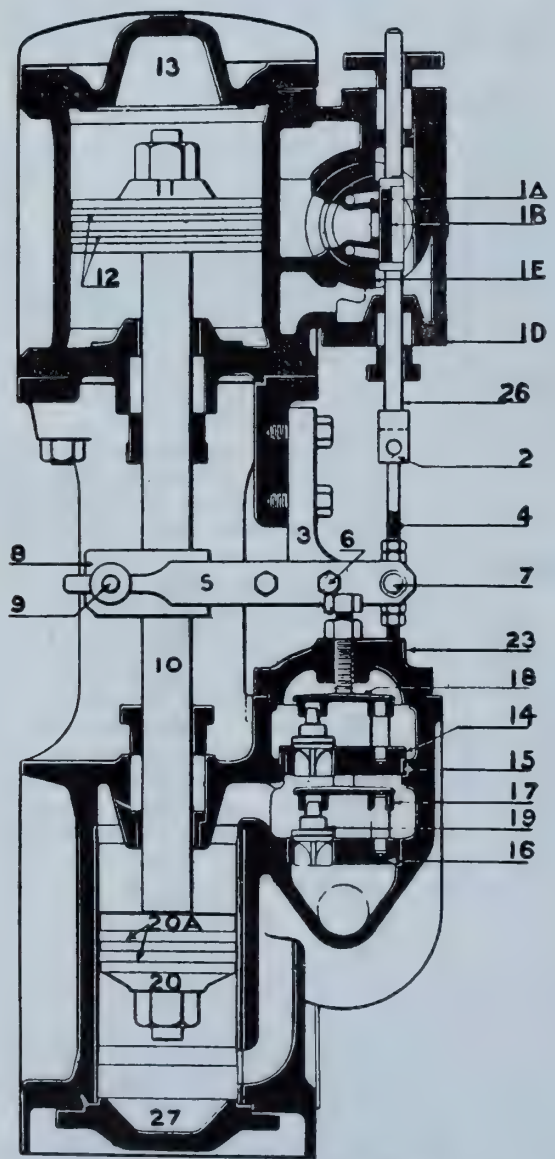
Service Applications of "Weir" Steam Driven Pumps

Staff Article

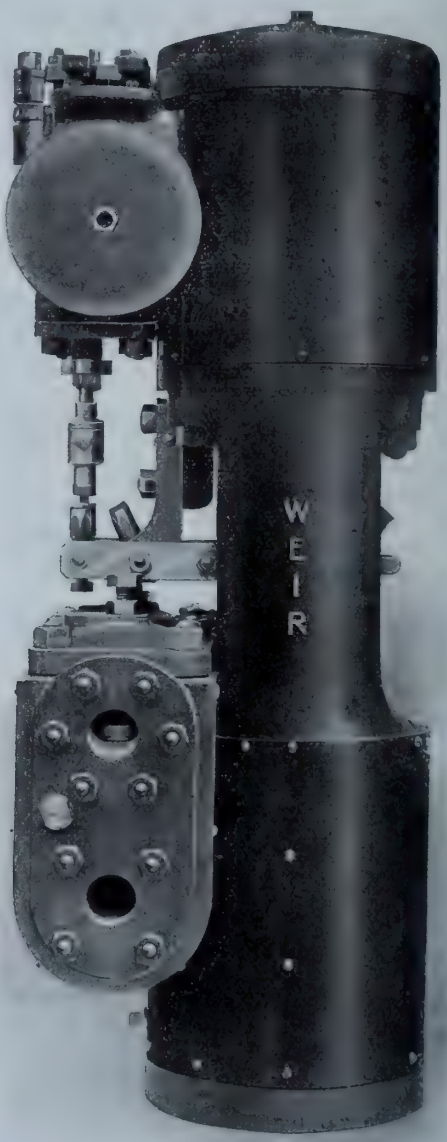
In our October issue, the design, construction and operative features of the valve mechanism with which the various Weir pump products are equipped, was dealt with at considerable length. The reliability of service rendered is indicated by their adaptation to every sphere of steam engineering practice—stationary, marine and locomotive.

AMONG the standard types of marine equipment manufactured by the Weir Co. there may first be noted the arrangement of a Pair of Pumps and Direct Contact Feed Water Heater. In this layout, the main engine feed pumps are fitted in the usual manner, but have a change valve fitted on the main feed pipe with a branch leading to the heater. Drawing from the hot well they discharge direct to the heater, which is always placed as high in the ship as possible. These pumps draw from the heater and discharge to the boilers. They are usually fitted with suction connections from the hot well, condenser and sea, and two discharges, one to the main feed check valves and the other to the auxiliary feed check valves. The pumps are independent of each other and duplicate in every part, with the exception that one pump is generally fitted with a cast iron liner and steel piston rod, the other having a sea suction being fitted with a gun metal liner, bucket, and cold-rolled manganese bronze rod. The iron-lined pump is used chiefly for feeding the boilers when the heater is in operation, but the brass-lined pump should always be used when drawing water from the sea.

One pump is usually sufficient to deal with the entire feed water and the other can be kept as a stand-by in case of emergencies. The action of the pump is automatic, as a float in the heater controls it, and the exhaust is usually connected to the low pressure casing or condenser. The pumps can be arranged to circulate through the boiler when raising steam, and where this is done it is usual to fit the pump bucket with gun metal packing rings instead of ebonite rings, the latter not being suitable for dealing with water over 190 and 200 degrees F. At higher temperatures the



SECTION THROUGH "WEIR" LOCOMOTIVE BOILER FEED PUMP.



"WEIR" VERTICAL TYPE LOCOMOTIVE FEED PUMP.

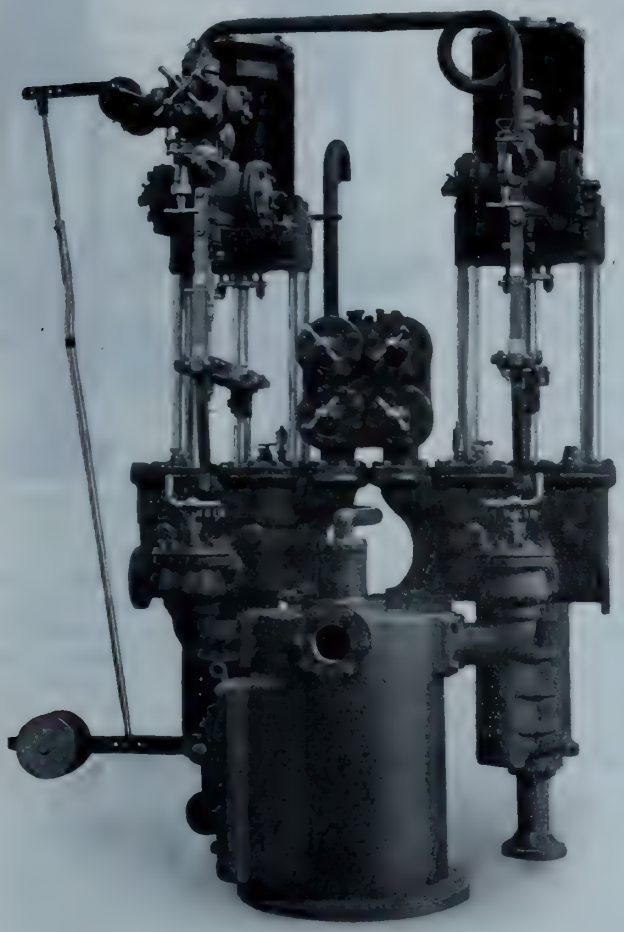
ebonite is likely to soften and seize on the pump cylinder walls.

Single Pump and Direct Contact Heater.

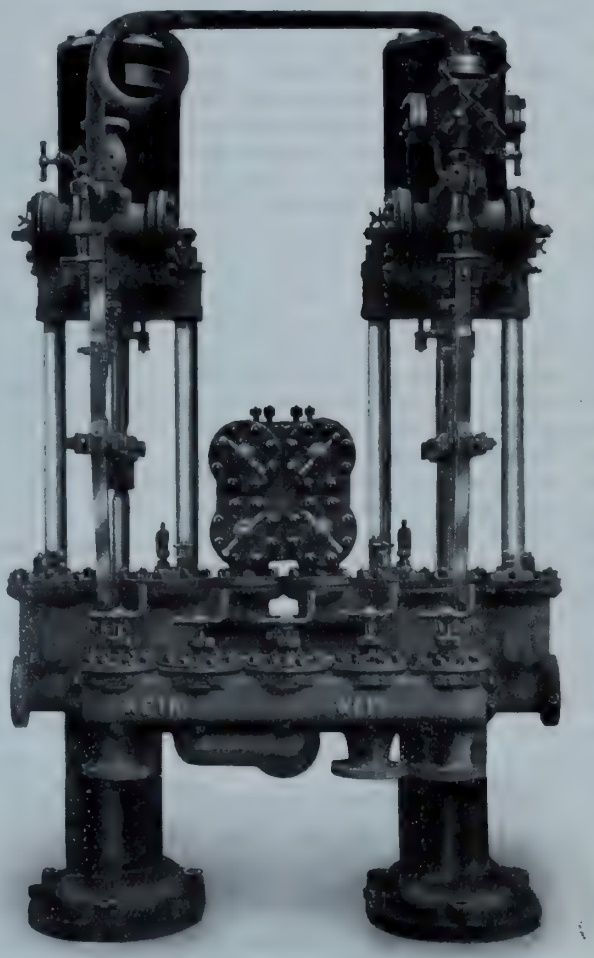
This arrangement is similar to the above except that only one pump is fitted instead of two and this draws from the heater and discharges to the boilers. It is usually made to draw also from the condenser, and is generally fitted with cast iron liner, steel piston rod, etc. It may also have hot well and sea connections. When the latter is required, the pump is provided with gun metal liner, bucket and cold rolled manganese bronze rod.

Pair of Pumps, Float Tank and Direct Contact Heater.

When this arrangement is installed, feed pumps are not required on the main engine. A float tank with automatic float gear similar in principle to that in the feed heater is placed under the feed pumps and into this the air pump discharges the feed water. One of the pumps draws from this tank and discharges to the feed heater, this pump being regulated by the float in the tank. The other draws from the feed heater and discharges direct to the boilers, and is regulated by the float in the heater. The pumps are in duplicate, one being fitted with gun metal liners, etc., and they are arranged so that either can discharge to the heater or the boilers. In case of an accident happening to one of the pumps,



PAIR OF MARINE FEED PUMPS WITH FLOAT TANK AND CONTROL GEAR.



PAIR OF "WEIR" MARINE BOILER FEED PUMPS.

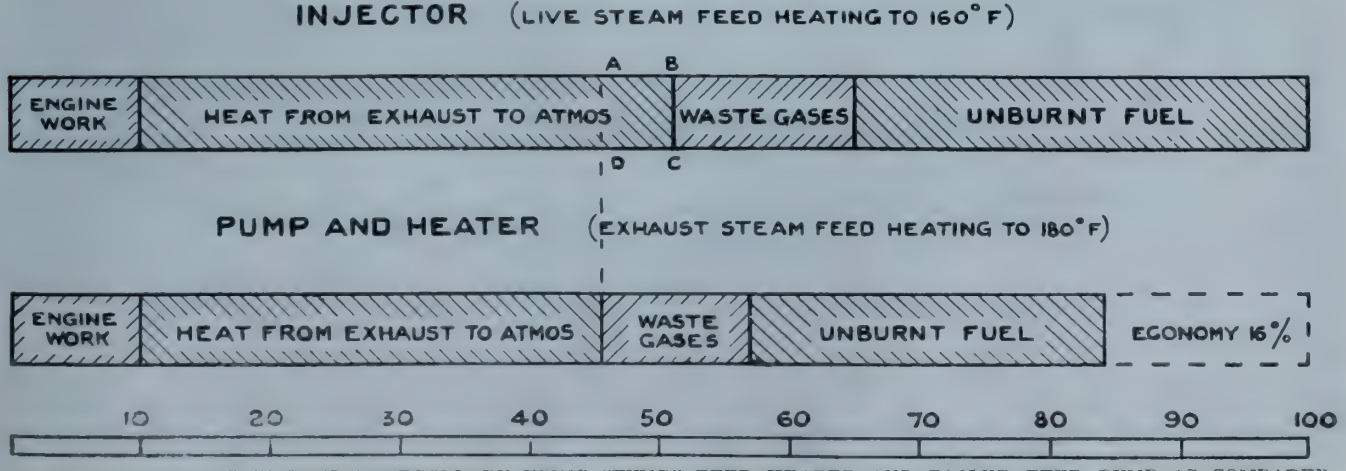


DIAGRAM OF SAVING IN FUEL EFFECTED BY USING "WEIR" FEED HEATER AND BOILER FEED PUMP AS COMPARED WITH INJECTOR.

the other can feed direct to the boilers from the float tank without using the feed heater, but a third pump is sometimes supplied to act as a stand-by.

Pair of Pumps and Float Tank.

In this arrangement, feed pumps are unnecessary on the main engines, a pair of pumps and float tank being used to deal with the feed water heater. This arrangement is fitted in a great many vessels where the engines run at a high speed, and it is accordingly inadvisable to use pumps on the main engines. With these independent pumps, the water is returned to the boiler independent of the main engines, and the engineer has two pumps automatically controlled by the quantity of feed water; each pump being capable of doing all the work when the engines are running at full power. The water is discharged by the air pump to the float tank placed under one of these pumps in any suitable position, and as this is placed lower than the float well there is no extra strain on the air pump. In this tank the usual float arrangement is placed which regulates the speed of the pumps. The pump draws from the float tank and discharges direct to the boilers, the second pump acting as a stand-by, or both can be used together. Both pumps have gun-metal liners and buckets. and cold-rolled manganese bronze rods. They have usually separate discharges to main and auxiliary feed checks

auxiliaries to the float tank through a non-return check valve. This valve should be fitted immediately under the diaphragm in the upper part of the tank, so that the steam may not impinge upon or damage the float. It is not advisable to raise the temperature above 180 degrees F., as the pump has to lift the water two or three feet, and a higher temperature would interfere with its working. The other method is to use a surface feed heater which is placed between the pumps and boilers, forming, in fact, a portion of the main feed pipe.

Single Pump and Float Tank.

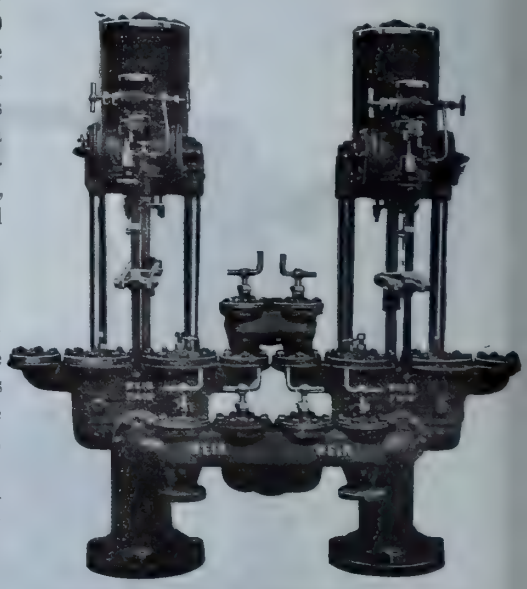
This arrangement is similar to the previous arrangement but without the second pump as a stand-by; and in this case the surface feed heater can also be used as above. In all of the foregoing, arrangements, the pumps are fitted with a steam connection direct from the boilers to enable them to draw from any source independent of any float regulating gear which may be fitted.

Units as Applied to Locomotives.

The boiler feed of locomotives has been chiefly by means of injectors. There have, however, been many experiments made with locomotive feed pumps in Europe. In fact, for over thirty years, these tests and experiments have been going on, and the savings in many cases over the existing forms of feeding have been rather a surprise, there being to-day many European roads using a pump to feed their locomotive boilers to the exclusion of all other methods. In all cases, feed water heaters are also in-

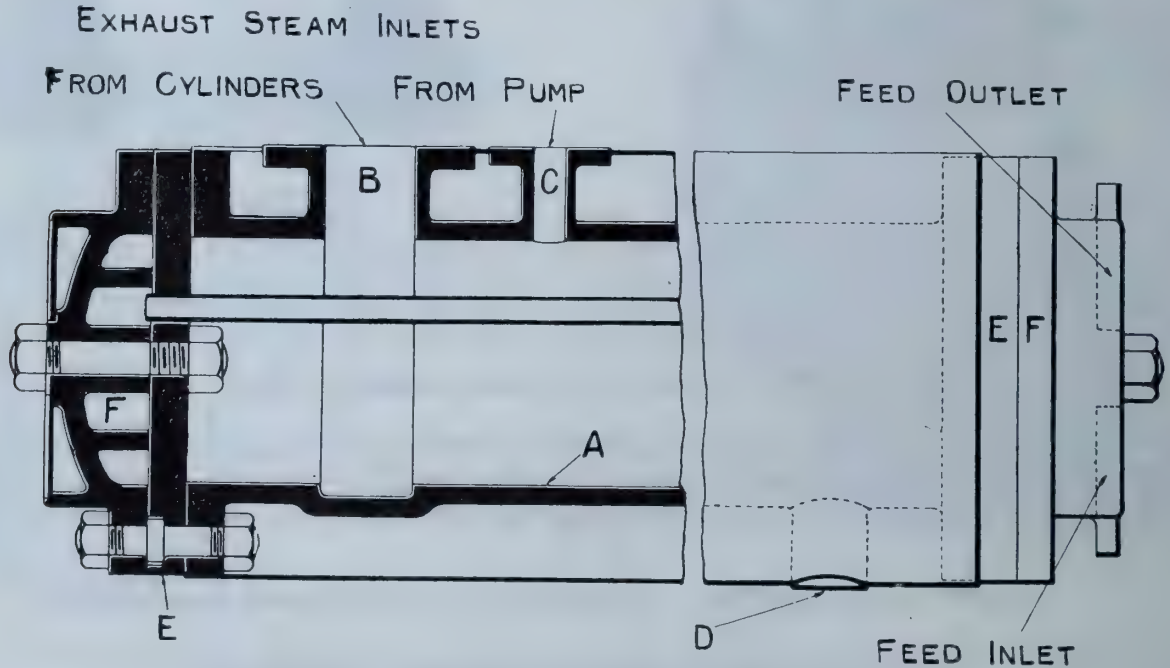
stalled. The Weir pump has been applied to this use with very satisfactory results.

Our Canadian railroad companies have stuck very closely to the injector and



PAIR OF "WEIR" PUMPS FOR LAND INSTALLATION.

inspirator, but they have about reached the limit of locomotive capacity in so far as size and weight is concerned, and any further increase will have to come through the channels of increased efficiency. When this fact became evident then the merits of the feed water heater and the boiler feed pump were investigated. The result is that we now find our great railways using Weir pumps in conjunction with a feed-water heater to great advantage. The heater utilizes some of the exhaust steam to heat the



PART SECTION, "WEIR" LOCOMOTIVE BOILER FEED WATER HEATER.

The direct contact feed heater is not used with this arrangement, but the feed may be heated in two ways—first, by leading steam from the L.P. receiver and the exhaust of the pumps and other

water, and is arranged in such a way as not to interfere with the draught, which this exhaust passing through the chimney is depended upon to give the fires.

The locomotive feed pumps are built in both vertical and horizontal units, and the results in some comparative tests made in Europe have shown a saving in fuel of about 16 per cent. The reliability of the system has been, we understand, fully proved. It has also been shown that its adoption is economical on the small yard shunting locomotives as well as on the large main line types. The additional weight is largely unimportant.

Key to Loco. F. P. Sectional View.

1A.—Main slide valve.
1B.—Auxiliary slide valve.
1C.—Main slide valve bells.
1D.—Bottom cover of piston valve chest.
1E.—Liner for piston valve chest.
2.—Double joint.
3.—Front stay.
4.—Bottom spindle.
5.—Valve gear levers.
6.—Front stay bush.
7.—Ball crosshead.
9.—Crosshead pin.
10.—Piston rod.
11.—Piston body.
12.—Piston rings.
13.—Cylinder cover.
14.—Discharge valve seat.
15.—Discharge valve seat ring.
16.—Suction valve seat.
17.—Suction valve guard.
18.—Discharge valve guard.
19.—Water valves.
20.—Bucket.
20A.—Bucket rings.
23.—Valve chest cover.
26.—Auxiliary valve spindle.
27.—Pump bottom cover.

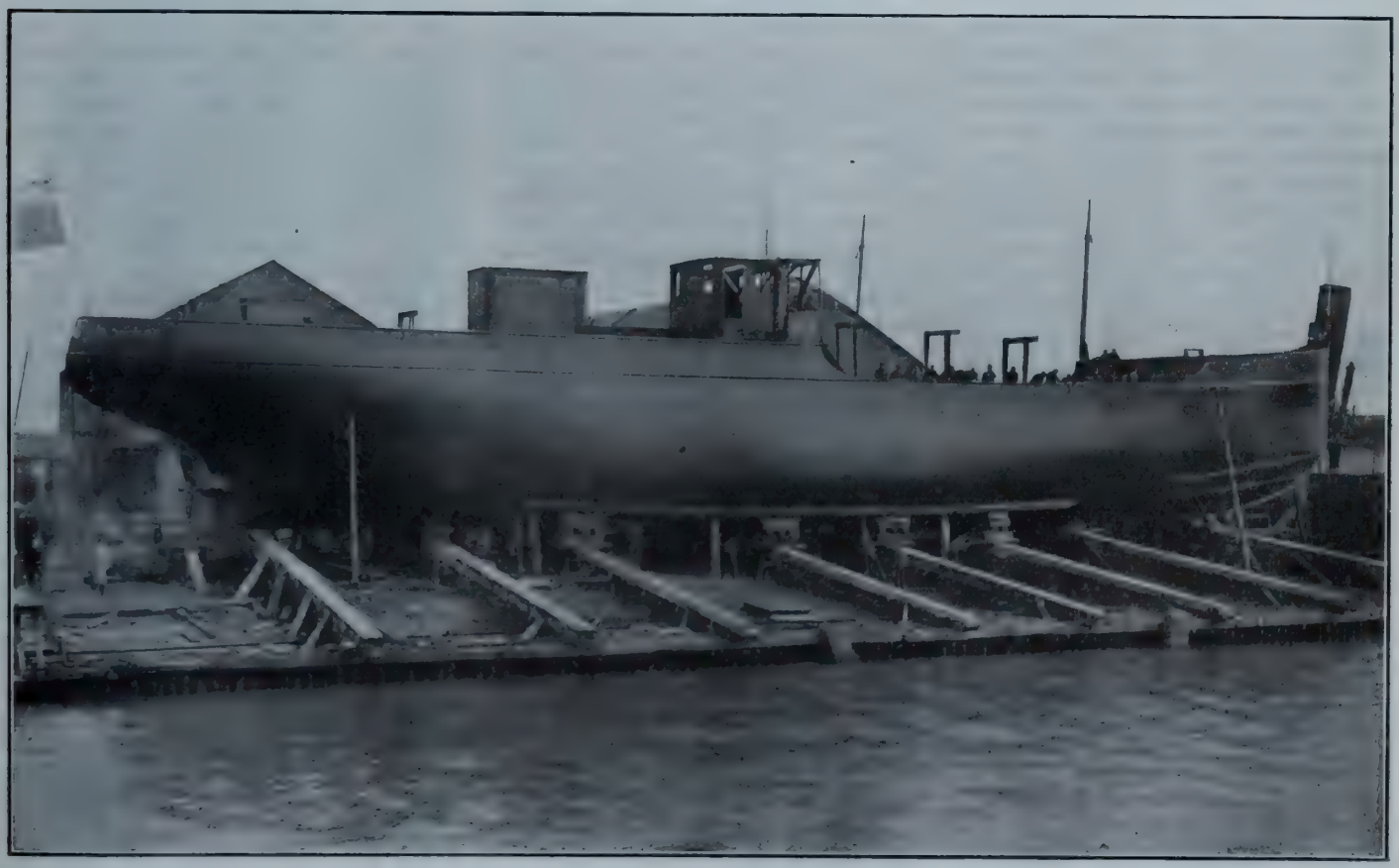
C. G. S. "GRENVILLE" LAUNCHED.

A LARGE number of prominent people attended the launching of the new Government steamer "Grenville" from the yards of the Polson Iron Works, Toronto, on Saturday afternoon, November 7. The vessel, which was designed by the Department of Marine and Fisheries, will be used for lighthouse and buoy service along the shores of Lake Ontario and the St. Lawrence River. She is a handsome all-steel boat, 164 ft. 6 in. long, with a beam of 30 feet, a depth of 13 feet, and built to class 100 A1 at Lloyd's.

She will be fitted with triple expansion engines, jet condensing, having cylinders 14 in.-22½ in.-28 in. diameter by 24 in. stroke. The engines are capable of developing 900 i.h.p. The boilers are two in number, Scotch type, 10 feet diameter by 11 feet long, of 180 pounds working pressure. There will be a complete electric light plant installed, and the vessel will be fully equipped in every other respect. The plans were prepared under the supervision of Charles Duguid, naval constructor for the Department of Marine and Fisheries, and the building and launching were under the supervision of William Newman, works manager of the Polson Iron Works.

The "Grenville" was christened by Mrs. Kemp, wife of Hon. A. E. Kemp, who represented the Government. At the conclusion of the ceremony Mrs. Kemp was presented with a handsome bouquet by Miss Margaret Miller.

The company held a reception in the offices, and among those present were: Lt.-Col. and Mrs. Peuchen, Mr. and Mrs. Grayson Burruss, Mrs. Taylor, Capt. and Mrs. Taylor, Marine Department, Prescott; Mr. and Mrs. R. R. Roane, Canadian Stewart Company; Mr. and Mrs. H. C. Chillas, Canadian Stewart Co.; Mrs. Osler Wade, Mrs. Chaplin Stevens, Miss Davies, Miss Taylor, E. Crooks, Canadian Inspection Company; T. B. Benson, Lloyd's, Toronto; W. H. Smith, Grand Trunk Railway; D. J. Brebner, Canadian Bitulithic Co.; M. Wilsher, inspector for Fisheries Department; J. Mancor, representing Lloyd's, New York; J. T. Matthews, E. A. Matthews, C. Duguid, naval constructor for the



CANADIAN GOVERNMENT STEAMER "GRENVILLE" PREVIOUS TO LAUNCHING.

Fisheries Department, Ottawa; Controller Church, A. G. Webster, representing Marine Engineering of Canada; Ald. Ryding, A. M. Asling, W. B. Tindall, J. Sittzler, Col. J. B. Miller, and W. Newman and A. H. Jeffery representing the builders.

THE WRECKED "CACOUNA."

THE Black Diamond Line steamship Cacouna wrecked at Fairyland Point, Newfoundland, last month, means the disappearance from the coal carrying trade on the Atlantic of one of the oldest and best known vessels, its blackened hull having been frequently seen in Montreal.

The loss does not materially deduct from the amount of tonnage at the disposal of the Dominion Coal Co., as the Cacouna only carried about 1,800 tons of coal, and had a net tonnage of 931. She was very useful, however, for the smaller ports where the larger vessels could not enter, and where unloading had to be done by hand. Out ports in Newfoundland and Nova Scotia constituted during later years her most frequent places of call. When sunk she was returning light from St. John's, Nfld.

The Cacouna was built at Newcastle-on-Tyne in 1885, and was 250 feet long, 38 feet 4 inches beam, and 16 feet 4 inches deep. She is the fourth collier to encounter partial disaster this season. There was the Storstad in the collision off Father Point with the Empress of Ireland, which it sank, although it was not hurt too badly to be repaired and be put again in commission. Then the Monkshaven went aground near Cape Chatte, but also got into the carrying trade again later. The Lingan damaged by the collision with the Government steamer Montmagny fifty miles below Quebec is at Quebec now. There were, as well, some minor injuries to vessels through colliding with ice floes or something of a like nature.

Despite these interruptions the Black Diamond fleet of vessels chartered or owned by the Dominion Coal Company is up-to-date with its shipments of coal to Montreal, and it is expected that before the 25th of November until which date they hope to sustain navigation the two million tons of coal contracted for will be delivered to Montreal, Quebec, Three Rivers and Levis. Of this amount, 1,560,000 tons have already been delivered, and of this 1,250,000 has been shipped to Montreal alone. Altogether from all sources, it is estimated that 2,600,000 tons will come into Montreal both from down the St. Lawrence and from above it.

Dominion Wreck Commission Investigations

Following the proceedings of a vessel stranding or collision inquiry is fascinating alike to the mariner and landsman. Much food for thought is always available, and in not a few instances it seems well nigh impossible to reconcile our conception of disaster prevention achievement when confronted with a detailed recital of the circumstances which contribute to many of what may aptly be termed marine tragedies.

"MONTMAGNY"—"LINGAN" COLLISION.

IN THE matter of a formal investigation held at the Court House, Quebec, October 6, 7, 8 and 9, and contined October 14 and 15, 1914, for the purpose of establishing causes responsible for the collision which occurred at 4.20 or thereabouts, on the morning of September 18, 1914, near Beaujeu Bank, in the River St. Lawrence, between the S.S. Lingan, and the Canadian Government S.S. Montmagny, resulting in the foundering of the latter ship and its attendant loss of life, the Court of Enquiry was presided over by Captain L. A. Demers, F.R.A.S., F.R.S.A., Dominion Wreck Commissioner, assisted by Captain Francis Nash and Captain E. C. Sears in the capacity of nautical assessors. The various interests were represented by the following counsel:—

The Canadian Government, by F. E. Meredith, K.C., A. R. Holden, K.C., and Eusebe Belleau, K.C.

The owners of the S.S. Lingan, by Hector McInnes, K.C.

Captain Pouliet, master of S.S. Montmagny, by Hon. L. A. Taschereau, K.C.

Francois Gaudreau, the Pilot of S.S. Lingan, by Senator August Choquette, K.C.

Captain Thomas Garbutt, master of S.S. Lingan, by Mr. Thomson.

Captain Pouliot's Deposition.

Captain Francois Zavier Pouliot in his deposition set forth that he is the holder of a Canadian master's certificate bearing No. 2629, and that the S.S. Montmagny of which he had command, was a steel built schooner rigged vessel of 722 tons register, with a speed of ten knots and a draft of thirteen feet aft and twelve feet forward, and that her crew numbered forty-seven all told, while the vessel itself was adequately equipped with all requisite navigating instruments, and carried two life and two surf boats, in addition to a gasolene launch.

That, on September 17, 1914, the Montmagny provisioned with stores to be distributed at various points in the River and Gulf, set out from Quebec with a passenger list that included the wives and eleven children of two Canadian Government lighthouse keepers, as well as an Assistant Fog Alarm Inspector named Ouimet.

What ultimately proved to have been her last stop was made by the Montmagny at St. Jean, Isle d'Orleans. At 4 a.m. on September 18, she was again under way, and while steaming towards the entry to Beaujeu Channel on a north-east course. with Goose Island Light bearing north-east half north, the mast head light of a steamer was observed a point and a half on the starboard bow, this in turn being followed by the appearance of a red light. The Montmagny then rounded the west end buoy and was hauled slowly to the eastward and with an altered course from N.E. by N. to N. E. by E.

Goose Island Range opened a fathom and a half, and the masthead lights of the oncoming steamer bore almost ahead with her green light showing. Two short blasts then sounded from the approaching vessel's whistle and the master of the Montmagny responding by one short blast, ordered hard aport, and reverse on starboard engine, the other vessel at this moment bearing two points on the port bow. Despite this manoeuvre, with lights distinctly visible through a clear atmosphere, and with the master, second officer, wheelman and lookout on the bridge of the Montmagny, the advancing ship which proved to be the Lingan, drove ahead and crashed almost at right angles into the port quarter of the Montmagny which was then heading S.S.E.

That the collision spelt disaster to the Montmagny was immediately apparent. She commenced to fill rapidly, lights went out, and within five minutes from the moment of the impact she had passed from the water's surface down to the river bed of the St. Lawrence.

The Lingan Chief Officer's Deposition.

Chief officer Olaf Swanson, deposed that he is the holder of a coasting master's certificate, bearing No. 4310, and that the S. S. Lingan is a single screw steel built vessel, having a speed of ten knots, owned by Furness, Withy & Co., and chartered by the Dominion Coal Co. That she carried a crew of forty-two seventeen of whom were Chinese deck hands, that her gross tonnage is 4,678, and that at the time of the collision the vessel was bound from Sydney to Montreal with seven thousand tons of coal.

That he, chief officer Swanson, went

on duty at four o'clock in the morning of September 18, and with him on the upper bridge were Pilot Francois Goudreau, apprentice pilot Kienig and a Chinese wheelsman, while a spare quarter-master did duty on the lower bridge, and a look-out was stationed on the forecastle head.

That, when the Lingan was steaming about nine knots on a S.W. by W. course, the red light of an approaching steamer was observed half a point on the port bow, succeeded by the appearance of the steamer's green light which crossed to the extent of a point on the starboard bow; this again being succeeded by the reappearance of the red light. A two blast signal was sounded on the Lingan's whistle, without, however, any corresponding alteration to the helm.

After an interval of two or three minutes, a second two blast signal was sounded accompanied by the pilot's orders of hard a port and full astern, which evolutions proved ineffectual, and at 5.22 Sydney time, the Lingan and Montmagny crashed together, with the grave sequel already known. A few moments, however, before the impact, witness hastened to the captain's room, below to apprise him of the ship's peril. Thereafter, orders were forthwith issued to lower boats, and witness hurried to the work of rescue, but in the meantime practically the entire crew of the Montmagny had crossed the foundering ship on to the bow of the Lingan.

Pilot Gaudreau's Deposition.

Francis Gaudreau set forth that his age is sixty-three, and that for thirty-three years he has held a pilot's license.

That, while on the Lingan's bridge on the morning of September 18, and keeping the Crane Island Range Lights nearly in one, he clearly discerned the lights of the Montmagny on the port bow, but upon perceiving the green light crossing to the extent of a point on the starboard bow, he sounded two short blasts on the Lingan's whistle, in compliance with a custom, to indicate to the other ship his intention of keeping green to green, but that despite his whistle signal, his helm remained unaltered. That, after a brief interval, a second two blast signal was given, and upon the reappearance of the Montmagny's red light, the helm was hard aported and the engines rung full astern, but all to no avail and the collision ensued almost immediately.

When questioned regarding a declaration made by him at the preliminary inquiry to the effect that apprentice pilot Koenig had undertaken on his own responsibility to sound the Lingan's whistle signals prior to the collision, the witness declared that he recalled having made such a statement but that he subsequently remembered having personally ordered the said signals and that none other than himself was responsible for them.

Lingan Master's Deposition

Captain Thomas Garbett deposed that his age is twenty-eight and that he holds a Board of Trade Master's certificate bearing No. 039935, and that for eighteen months he had been in command of the Lingan. Considering that clear weather prevailed and that a licensed pilot as well as a properly certificated officer were on the bridge, he, the master, retired to his room and undressed. That, upon being awakened by the signal whistles of his vessel he made a hasty exit, and that simultaneous with his encountering the chief officer at the foot of the ladder, the collision occurred. Witness thereupon hastened to the bridge and after ringing the engines slow ahead to keep the bow of the ship in the Montmagny's wound, he ordered boats to be lowered, but the Montmagny soon fell away, and disappeared beneath the water's surface.

Witness emphatically declared that the Lingan steered well, that her compasses were correct, and that after the foundering of the Montmagny and while his boats were patrolling the waters, he proceeded with his ship to safe anchorage and there awaited the return of the searchers from the scene of the disaster. He further averred that it was with the owner's permission that his, the captain's wife was a passenger on the Lingan since the month of April last.

Evidence of Divers.

William Wallace Weatherspoon, a superintendent of submarine work and Edward Tuck, a practical diver, both deposed that several descents had been made to the submerged ship with the object of first liberating if possible the encased victims of the disaster, and then to ascertain the injury sustained by the Montmagny; but in both instances their efforts were to no purpose, as wreckage and debris completely cut off communication with the cabins occupied by the passengers, while the opaqueness of the waters put beyond human endeavor the knowledge sought of the ship's damage.

Captain Gagnon produced a chart displaying thereon the exact position of the Montmagny obtained by sextant angles and, by accurate measurement, the sunken ship is shown to be presently lying nine hundred feet south of the midship or middle line of the channel. The Lingan's Chinese wheelsman, when supplied with a compass and directed by the Court to indicate thereon E.N.E. and N.E. by E, invariably pointed to E.N.E., thereby demonstrating a total ignorance of compass courses.

Review of Evidence.

In reviewing the varying statements and calculations as to the time and distance made by the different witnesses, the Court must necessarily accept with reserve impressions that are drawn from moments of grave anxiety and threatening peril; but the testimony of the master of the Montmagny, while receiving no verbal corroboration through the distressing loss of his accompanying bridge officer, is nevertheless given a silent substantiation by circumstances which eliminate all doubt.

Captain Pouliot's declaration that his ship was steaming along to the south of the mid-channel line has not been disproved, and while the Lingan's pilot must have known that the tortuous character of the river bed necessitated a change in the approaching vessel's course, the Montmagny's hard a porting, and one blast signal gave unmistakable evidence as to her intention at the time, while the sextant bearings now locating the submerged wreck at nine hundred feet from the centre of the channel give silent yet immutable testimony to the fact that the collision occurred south of the mid-channel line.

On the other hand, the seamanship of the Lingan's pilot is to be deprecated. Even accepting his assumption that the Montmagny was to the north of the channel, or slightly on the Lingan's starboard bow with Crane Island Lights in one, the duty of the Lingan's pilot in such contingency, would have been to reduce the vessel's speed, knowing as he must have known that the approaching vessel, by the nature of the leading marks must necessarily change her course and therefore the sounding of a two-blast signal by the Lingan without a corresponding movement of the wheel, while not directly contributing to the collision, was nevertheless misleading and a contravention of the rule. Again, the sounding of the second two-blast signal accompanied by a hard-a-port order was a flagrant violation of the accepted rules of practical navigation, and clearly reveals the utter impotence of the pilot at a crucial moment.

Chief officer Olaf Swanson evidently disregarded the responsibility invested in him as officer of the watch representing the master, when, in the first instance, he permitted without interference, the pilot's signals in direct contravention of the rule-of-the-road, and again, when he, Olaf Swanson, at the perilous moment of an inevitable collision abandoned the bridge to summon the master.

This court cannot view lightly such outstanding features of faulty navigation as the misleading and erroneous signals of the Lingan's pilot; the mate's submissiveness to such flagrant violations of the rules-of-the-road followed by his flight from the bridge with his ship in peril; the Chinese wheelsman's ignor-

ance of the compass and his utter unfamiliarity with other language than his own, and lastly the Master's undressing and retiring while his ship was navigating narrow and dangerous waters.

Court Finding.

The court, having carefully enquired into the circumstances attending this shipping casualty finds, for the reasons set forth in the foregoing report, that this collision was due entirely to faulty navigation on the part of the Lingan's pilot and crew.

Pilot Francois Gaudreau and chief officer Swanson are therefore found to be in default by this court. The license of the said Francois Gaudreau is hereby suspended from the 20th of October, 1914, for the balance of the season of navigation of 1914, and a fine of $200.00 is imposed upon him to be paid quarterly in $50.00 instalments.

The certificate of Olaf Swanson is suspended by this court for a period of ten months, the said suspension to date from October 20, 1914.

The master of the Lingan, Thomas Garbett, while exonerated in the matter of the present collision and while due cognizance is taken of his commendable and prompt action following his arrival on the bridge, is nevertheless criticized and reprimanded by this court for having undressed and retired while his ship was navigating a narrow and difficult section of the river, and his action in this regard is all the more reprehensible when it is considered that the propitious weather conditions that prevailed since the ship's departure from Sydney had not necessitated his keeping lengthy vigil upon the bridge.

The master of the Montmagny was at his post on the bridge prior to and at the time of the collision, and while navigating his vessel to the south of the mid-channel indicated by one blast of his whistle and a corresponding movement of the helm that he would retain that side. In view of this it is held that the said Captain acted in accordance with the rule-of-the-road and he is therefore exonerated by this court.

The duration of time which the Montmagny remained afloat following the impact formed the subject of keen inquiry, and as the preponderance of evidence estimated it to have been five minutes, the work of rescue was necessarily restricted to an all too short a period. Brief though it was, it is nevertheless to be replored that the flight of almost its entire crew from the decks of the Montmagny over the rails of the Lingan remain unmarked by a single valorous deed, and the more lamentable indeed is all this when one is forced to reflect that children raced the decks of the foundering ship while the fleeing crew leaped to safety and ignored their cries.

Further we most emphatically state that the proverbial bravery of sea-faring men was not displayed on this occasion. The master was not the last man to leave his ship; the steward failed to show that he made special efforts to waken and assist the passengers who were practically and to all intents and purposes under his charge, and the engineer who claims he had the two children with him abandoned them to save himself.

CANADA—CAPE BRETON COLLISION.

FOR lack of ordinary judgment, Captain Philoleme Blouin, master of the steamer Canada, a coasting steamship trading between Montreal and Gulf ports, was severely censured in the decision which Captain L. A. Demers, Dominion Wreck Commissioner, rendered on November 18, at Montreal, as the result of the investigation which he conducted into the collision of the Canada and the Cape Breton, a freighter, in the harbor on October 7 last.

In addition Captain Blouin was ordered to pay the costs of the case, amounting to $187.50, the cash to be paid into the Marine and Fisheries Department before December 15. If this be not done, Captain Demers orders that the costs be collected by distress upon the goods and chattels of the captain, and if there are not sufficient to meet the distress he condemned the skipper to a month in jail.

The master and pilot of the Cape Breton were exonerated from blame.

S.S. "ANGLO BRAZILIAN" STRANDING.

IN the matter of a formal investigation into the causes which led to the stranding of the steamer "Anglo Brazilian" in Montreal Harbor, on or about the 26th day of August, 1914, held in the Wreck Commissioner's Court, Montreal, Quebec, on September 8 and 9, 1914, before Captain L. A. Demers, F. R. A. S. Dominion Wreck Commissioner, assisted by Captains Francis Nash and Pilot Alberic Angers, acting as nautical assessors.

The various interests were represented by A. R. Holden, K.C., for the owners, the New Zealand Steamship Company; Sir A. R. Angers, K.C., for the pilot, and Walter Johnston for the Imperial Merchant Service Guild. Fourteen witnesses were examined, amongst which was the harbor master of the Port of Montreal. Captain Bourassa, who stated that the day prior to the departure of the Anglo Brazilian he saw that sufficient room was given for the hauling out of the said vessel the next day, and did not notice any barge lying at the end of Tarte Pier, nor had he given permission to berth any vessel at that place.

The master of the vessel, Frederick William Richardson, was the next witness. He stated that the Anglo Brazilian is a steel vessel of 4,668 tons net, and 7,486 gross tonnage, carrying a crew of 38 all told, including three deck officers all duly certificated. The necessary instruments for the navigation of the ship were supplied and were efficient for the purpose. The vessel is owned by the Nitrate Producers Steamship Co., of London, and was chartered by the New Zealand Steamship Co.

The Anglo Brazilian was fully loaded with 9,000 tons of general cargo, and was bound for Australian and New Zealand ports, via Quebec. At the time of leaving the wharf at Montreal she was drawing 27 ft. 2 ins. fore and aft. The vessel left the wharf at 6.15 a.m. on August 26 in charge of branch pilot C. B. Hamelin, and with the assistance of two tug boats, as usual. The vessel was hauled from the wharf into the stream, and at a little distance above the berthing place which she had just left, the bow tow rope parted and the vessel swung around with her bows to the south, under the effect of the current, and grounded on a bank and hung by the middle.

Prior to the rope parting and when endeavoring to head up stream, he noticed a scow at the end of Tarte Pier, and in order to clear the said scow the helm was starboarded and the vessel shortly afterwards took a sheer, and before she could recover the tow rope parted. He also avers that the steering gear and rudder were alright as they had been examined half an hour before the lines were cast off. The gear is of the telemotor type. When the pilot reported something wrong with the gear, the engineer was ordered to make an examination and reported everything was alright. The exact position of the ship when aground was ascertained by the following bearings: — Convent North 41½ west; Laurier Pier north 22 west; gas buoy 193 M, south 65 west; ship's head south 7 west, magnetic.

The master of the tug Aurelin G, which was the stern tug, said that he noticed at a certain stage, when the ship was heading up river to turn around, that the rudder remained amidships, which appeared to him as strange, and he called out to the pilot advising him of that fact; but is not aware if the pilot heard him.

The pilot of the Mathilda, the tug boat at the bow, testified that to him the hawser which was passed to his vessel did not seem to be good, therefore, he did not think it advisable to put all the power on his boat and had, up to the time of the parting of the rope been going on the speed of four bells, which is apparently a local custom and signifies

that the engines were working to obtain a speed on the tug of slightly over slow speed.

The pilot stated that it is his impression that for some moments something occurred to impede the working of the steering gear, and therefore can only account for the ship not recovering more promptly, to that fact, also to that of the parting of the tow rope. He also stated that if no scow had been tied to the end of the Tarte Pier he would have passed at the usual distance from the end of the pier, and would consequently have benefitted in space as well as in the eddy forming between Tarte and Laurier piers.

The evidence of the other witnesses did not materially differ from that given by preceding ones.

Finding.

In view of the evidence obtained through a very searching examination, the court is unanimous in exonerating the captain and officers of the S.S. Anglo Brazilian, as well as the pilot, for the stranding. It has been conclusively demonstrated that everything was done that could have been done in the circumstances, and that the grounding was due to the parting of the tow rope at a critical moment.

We have made a special examination of the steering gear and ropes, and we found that at the time of the visit on board the steering gear did not come up to our expectations; but we found it was due to a hot bearing, caused by a little dirt having been left the day previous during the overhauling by the fourth engineer. However, the machinery and rudder worked in a satisfactory manner afterwards.

With respect to the ropes, we have ascertained that those shown, and which were used on the occasion of the grounding, were good sound ropes. The first one shown seemed to have had somewhat more usage than the last one which broke, and which was, in our opinion, the direct cause of the casualty.

With regard to the scow tied at the end of Tarte pier, we recommend that the by-laws governing the duties of the harbor master, and vessels within the harbor limits, should be stringent. The fact of the scow being berthed at the end of the pier without the knowledge of the harbor master, and contrary to the by-laws of the Montreal Harbor Commissioners, reduced the already narrow space in which vessels leaving Tarte and Laurier piers and vicinity have to manoeuvre.

We suggest that no vessels of any description be allowed at the end of any berths, as in view of the narrowness of the spaces such berthing is fraught with danger to the vessel so berthed and exposes others passing by to meet with delay, if not disaster.

Whilst we do not attribute this accident to the fact that the scow was tied to the end of Tarte pier, yet, we affirm it would have been better if such had not been there.

TORONTO HARBOR IMPROVEMENTS.

ONE season's work by the Harbor Commission on their elaborate programme of harbor improvement on the water front shows satisfactory results. From the mouth of the Humber eastward over 2,700 feet of crib work has been laid and weighted with stone. All that is to be seen, however, is the framework sticking out of the water, but underneath is the foundation for the new seawall, which will extend practically along the whole waterfront. Next spring the commission expects to commence the work of filling in on the lake shore in readiness to complete the water lane for pleasure craft, and diverting the old Lake Shore road, allowing for an 86-foot radial entrance. From the east about one thousand feet of cribwork has been constructed, which means that approximately one-third of the foundations for the seawall is finished. The central section will be built into wharfages and further east reservations for parks are made. The Don diversion at the foot of Leslie street is practically completed. The work of reclaiming Ashbridge's Bay is also well under way; the powerful hydraulic dredge Cyclone being engaged in dredging commercial routes in the bay.

Work will continue right up till the bay is frozen over, after which it is the intention of the commissioners to proceed with the pick and shovel work as much as possible in order to help out the unemployed situation. It is expected 200 men will be kept going all winter.

C.S.C.E. VISIT NEW WELLAND SHIP CANAL.

AN interesting and highly-instructive visit was paid to the Welland Ship Canal Works on October 31 by the Toronto branch of the Canadian Society of Civil Engineers. Over 180 members made up the party, which consisted principally of engineering students from Toronto University, who are also student members of the C.S.C.E. Among other prominent members present were A. K. Stewart, chief engineer C.N.R.; G. M. Going and M. Hewson, of the G.T.R.; Professor Haultain and Dr. Ellis; J. S. Weller, chief engineer of the Welland Ship Canal, and staff.

Upon arrival of the party at Thorold, a move was first made to the site of lock 7 and the G.T.R., Welland branch, diversion. The sites for locks 6, 5 and 4 were then visited, all this work being in section 3, after which lunch was partaken of in the construction camp at Thorold. After lunch, the party were taken on cars along the line of the canal to Port Weller, on Lake Ontario, and the work in progress examined carefully, the engineering features being explained by the staff of canal engineers. This part of the work is included in sections 1 and 2, and several interesting engineering undertakings were to be seen, consisting of work on the excavation for the head of lock 2, the drag-line excavators at work in the canal prism, and the operation of the Western grading machine. Section 1 includes lock No. 1, where the reinforced concrete walls are being constructed. It also includes the building of the harbor and dredging of same. Wood trestles are run out into the lake, and all surplus material dumped on the trestles, the purpose being to form a harbor.

Considerable time was spent in this section, after which the party returned to St. Catharines, where dinner was served at the New Welland Hotel. This concluded a most interesting day, all of those present highly appreciating the efforts of Mr. Weller and his staff of engineers in explaining the work in progress.

BRITISH WRECKS REPORTED IN OCTOBER.

THE number and net tonnage of British vessels, respecting the loss of which reports were received at the Board of Trade during the month of October, 1914, and the number of lives lost, are as follows:—

Description	No.	Net tonnage.	Lives lost.
Sailing	16	971	11*
Steam	49	58,779†	123‡
Total	65	59,750	134

* Including three lives lost in a sailing vessel sunk by a mine.

† Including 23 steamers of 36,571 tons sunk by German war ships, and six steamers of 8,722 tons sunk by mines.

‡ Including 31 lives lost in steamers sunk by mines.

The above table is a record of "reports received" in the month, and not of wrecks which occurred during the month. Many of the reports received in October relate to casualties which occurred in previous months.

The figures include the losses of 10 sailing vessels of 565 tons, and eight steamers of 4,030 tons belonging to British Possessions abroad, involving the loss of the lives of nine persons, of whom eight were lost in sailing vessels and one in a steamer.

Casualties not resulting in total loss of vessels, and the lives lost by such casualties, are not included.

The Rule of the Road Practically Explained-II.

By Captain Wheeler, Ex. M., F.L.T.

This series of articles, for the publication of which we are indebted to the Motor Ship and Motor Boat, will serve to clear up many misconceptions that exist concerning the regulations which have been formulated to secure immunity from collision by vessels of all kinds and in all waters.

TRAWLERS.

STEAM trawlers carry in the same position as the white masthead light of an ordinary steamer (and, instead of that light), a tri-colored lantern showing a white light from right ahead to two points on each bow, and a red and green light from two points on the bow to two points abaft the beam on the port and starboard side respectively. Below the tri-colored light is also shown an all-round white light, not less than 6 ft. nor more than 12 ft. beneath. A sailing trawler shows the all-round white light, and on the approach of or to other vessels shows a flare-up light.

All the lights for trawlers must be visible at least two miles, and when the trawlers are not engaged in fishing they must carry the same lights as other vessels under way. Oyster dredgers and other vessels using dredge nets carry the same lights as trawlers.

Fishing Vessels.

When fishing vessels are engaged in fishing, whether at anchor or not, they indicate this in the daytime by exhibiting a basket or other efficient signal where it can best be seen. When they are at anchor, other vessels should pass on the side where the signal is indicated.

Fishing vessels may at any time show a flare-up light in addition to their navigation lights, and also use working deck lights. When the fleets are working together, it is the custom on the Admiral's vessel to indicate the time of shooting or hauling trawls by means of rockets, so that uniform working may result. They may also, as well as every other vessel, show a flare-up light or use any detonating signal which cannot be mistaken for a distress signal.

Any Government may at any time make special rules regarding lights or signals for vessels of war or vessels proceeding under convoy. The exhibition is allowed of night signals, which have been adopted by shipowners in order to denote to a signal station that the vessel belongs to a certain owner, providing such signal has received the authority of its respective Government and been duly published. These private signals are now dropping out of use owing to the more extensive use of wireless telegraphy and Morse code-signalling.

Excepting the lights for vessels engaged in laying telegraph cables or vessels on pilotage duty, the foregoing contains all the lights which are shown by vessels under way, and attention is now drawn to the lights exhibited by vessels at anchor or which for some reason are not under sufficient command and thereby compelling other vessels to give way. Every vessel of less than 150 ft. long carries an all-round white light in the same position as her masthead light, and when over 150 ft. she shows an additional all-round white light at or near the stern at such a height as to be at least 15 ft. lower than the forward light.

The rules require the light on vessels less than 150 ft. to be not over 20 feet above the hull, and vessels over 150 ft. long must carry the forward light between 20 ft. and 40 ft. above the hull, such height to be governed by the same conditions applying to the masthead light. Except that such lights must be carried forward, choice of position is left to the discretion of those on board. It frequently happens that the position chosen for the forward light is either in the rigging of the foremast or even on the halyards used for the masthead lamp. Such proximity to the mast is dangerous, as the light is bound to be obscured over a certain area by the mast itself, and the writer has on more than one occasion had to take speedy action in order to avoid running down a vessel at anchor, whose proximity was only ascertained by the sighting of the vessel itself, the light being hidden either by the funnel or mast. As anchor lights are only required to show at one mile distance, a steamer traveling at 10 knots has not many minutes to play about with, especially in such a case when the master's attention may be employed in picking up shore lights.

Anchor Lights.

Another point worthy of attention is the laxity of some yacht owners in exhibiting anchor lights. Even in places where sea-going vessels do not pass close to the anchor grounds of yacht clubs, if your boat is at anchor keep the anchor light going. Another yacht might be approaching to anchor, and happen to collide with yours; should you have the light going, any claim for damages would be upheld, but woe betide you if your light is out, as you are liable for damages to your own craft and also to the colliding craft, notwithstanding that the other vessel is supposed to give way. Even in crowded navigable waters the anchor light is often neglected.

During the day time, it is not usual for an anchored vessel to show any signal denoting she is at anchor, but in certain navigable waters certain local regulations require that every vessel at anchor must, in daytime, show forward, in the same position as the anchor lamp, a black ball or shape. Should your vessel be required to follow some similar regulation and no ball is on board, a cork fender will answer the purpose. Such a signal is to be greatly recommended where vessels have to anchor while awaiting tide time to enter docks, as it can then easily be seen whether vessels are under way and moving slowly towards the docks, or just stationary, but with the anchor down. An approaching vessel can then take such action as necessary to avoid collision.

Cable Laying.

Vessels "under way," but not under command, in addition to the side and stern lights, carry two all-round red lights in the same position as a steamer's masthead light, but the masthead light is never carried. The sidelights are only carried when the vessel is making way through the water. A vessel employed in laying or picking up a telegraph cable carries, instead of her masthead light, but in the same position, three all-round lights, the highest and lowest being red, and the middle white. In both cases, the lights are carried in a vertical line, one over the other, and not less than 6 feet apart, and of such a power as to be visible two miles. During the daytime, the vessel not under command shows two black balls or shapes, 2 ft. in diameter, and the cable ship shows three shapes, the highest and lowest being globular in shape and red in color, while the middle one is diamond shaped and white. The shapes are, in every case, to be carried in the same position as the lights. These signals do not indicate that the vessel showing them is in distress and wants assistance, but only that she is not under command, and cannot give way to an approaching vessel, the latter, therefore, being compelled to keep out of the way.

Pilot Vessels.

Pilot vessels, when engaged on their stations on pilotage duty, do not carry the navigation lights required by other vessel of their tonnage, but show an all-round white light at the masthead, and, in addition, show a white flare-up light at short intervals not exceeding 15 mins. The sidelights are not exhibited excepting on the near approach of or to other vessels, when they are flashed at short intervals to denote the direction in which they are heading. Small pilot boats, such as are compelled to go alongside another vessel to put a pilot on board,

need not carry the white light at the masthead, but show it above the gunwale, and they can also carry the sidelights in a combined lantern with suitable colored glasses.

In recent years sailing pilot vessels have been largely replaced by steam or motor vessels, and these carry at the masthead, in addition to the all-round white light, an all-round red light, 8 ft. below, both to be visible all round the horizon for a distance of at least two miles. These lights are carried so long as she is engaged in pilotage duties, and she carries her sidelights only so long as she is making way through the water; while at anchor, she still carries the masthead lights in addition to the ordinary lights required for a vessel of her tonnage when at anchor.

Summary of Vessel Lights.

A general summary of the lights shown by vessels is now given, and, on sighting a light or lights at sea, they will come under the following heading, while a nearer approach will then classify them in their proper denomination:

A single white light may be either a steamer's masthead light; vessel's stern light; anchor light; pilot boat; open boat; an open fishing boat with tackle of less than 150 ft. in the sea; or a lighthouse or buoy light.

Two white lights, one just above the other, may be a steamer's two masthead lights, with the vessel heading nearly for your direction; a vessel towing another; fishing vessel of less than 150 ft. long which is at anchor, or with her gear fast to a rock, as she then shows a small white light a short distance away from her anchor light and in the direction of the nets; or a vessel exceeding 150 ft. long when at anchor.

Sidelights may be carried by any vessel, except fishing and sailing vessels of less than 20 tons gross, when making way through the water, and carried alone by sailing vessels and vessels towed.

A white light or flare-up light may be either a sailing pilot vessel or a sailing trawler.

A white light, with colored sidelight, may be an approaching steamer, or a steam trawler heading in such direction as to obscure the white portion of her tricolored masthead lamp.

Three white lights denote a vessel having more than one vessel in tow, and where the distance from the stern of the tug to the stern of the last vessel towed exceeds 600 ft.

Two red lights, a vessel not under command.

Three lights vertical (red, white, red) denote a cable ship at work, and the exhibition of sidelights in the two latter cases signifies that the vessels are making way through the water.

A white light over a red is a steam pilot vessel. (See also white light with colored sidelight.)

A single red light at the masthead, in addition to the anchor lights, is sometimes used to denote that the vessel is in quarantine, or she may be handling explosives. These are usually local signals.

Two white or two red lights vertical on a yard arm, and a single light at the other end of a yard arm, usually indicate a dredger at work, and an approaching vessel must pass on the same side as the two lights are shown. White lights such as these also denote a wreck-marking vessel.

PANAMA CANAL NOTICES.

THE following notices relative to navigation and other matters connected with the administration of the Panama Canal have been recently issued. Familiarity with the contents which follow herewith will tend to the elimination of delay and inconvenience on the part of vessels making use of the waterway.

Notice to Steamship Lines.

1.—The attention of the Canal authorities has been called to the fact that several of the firms whose vessels have been using the Panama Canal have seen fit to employ agents on the Isthmus, to take care of the interests of their vessels in regard to the payment of tolls and minor charges.

2.—This is not only unnecessary, but frequently results in delays which might otherwise be avoided were their business done direct with the Panama Canal.

3.—Ship-owners are informed that provision has been made in accordance with Canal regulations, by which deposits to cover tolls can be made with any of the assistant treasurers of the United States, who are to be found in larger seaports, or with the assistant auditor of the Panama Canal at Washington, D.C. As soon as these deposits are made cable information is sent to the Panama Canal.

4.—In case a vessel should desire to purchase coal or supplies at either terminal port, or contract a bill for pilotage or towage, deposits to cover these expenses can be made in the same way as for tolls.

5.—The price of coal at Cristobal is $5.40 per ton, and at Balboa $6.40 per ton. Tug service is at the rate of $15 per hour. The probabilities are that unless a vessel be over 15,000 gross tonnage there will be no charge for tug service; nor will there be any charge for pilotage for a vessel in transit through the Canal unless she takes on or discharges freight or passengers in a terminal port.

6.—It is advisable that deposits be made somewhat in excess of the tolls, cost of supplies, and charges for services, so that there will be sufficient funds available to cover bills not anticipated, since all bills are payable in advance before a vessel is allowed to enter the Canal or clear from Canal waters.

7.—Vessels that require answers to cables should prepay them or else deposit sufficient funds to cover in the same way as for tolls.

Rates for Miscellaneous Services.

The rates quoted below are effective for the following services furnished individuals, companies and others:

1.—For service of a diver, his assistants, and apparatus, for the first four hours or fraction thereof, from time of arrival at point of diving.....	$60.00
For each succeeding hour or fraction thereof	10.00
2.—Compressed air, per 1,000 cubic feet	.12
3.—For giving cable notice of deposits with the treasurer or assistant treasurers of the United States to be applied in payment of tolls, material, supplies and services	5.00

Canal Pilotage.

The regulations concerning charges for pilotage are so far amended that in future when vessels enter for the purpose of passing through the Canal, and do not take on or discharge freight or passengers, but do take coal or supplies, they will not be charged for pilotage.

PANAMA CANAL TRADE.

IN the two months from August 15 to October 15, during which the Panama Canal has been open, 113 vessels carrying in the aggregate 583,949 tons of cargo have passed through the waterway. This is about what was expected of the early period of the canal's use. Among other things it is suggested that the canal traffic is considerably affected by the war in Europe.

The heaviest traffic, it is said, has been between the Atlantic and Pacific ports of the United States, a trade in which only Americans vessels can engage, as they have a monopoly of the coastwise traffic of the United States. Manufactured goods and general merchandise have been carried through the canal in great variety chiefly from the port of New York and secondarily from Boston, Philadelphia and New Orleans to California and Puget Sound ports and also to Honolulu.

Traffic from the Pacific ports of the United States and Southwest Canada, mostly in grain, is regarded as largely seasonal, owing to the wheat harvest. Ten vessels have gone through eastbound on this route with grain.

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PRINCIPAL CONTENTS.

THE WAR AND SHIPPING.

IT is quite apparent that the European War as far as it has progressed has been fraught with disastrous results, not only to commerce and industry in the countries more immediately involved, but in every land where business enterprise has a foothold. That some degree check or upset should result was only natural because, in spite of fads and creeds, we are nationally, Imperially or internationally, as well as individually, interdependent.

At this writing, the industrial outlook has brightened considerably. Our big corporations and those responsible for extensively equipped business enterprises have in the interval set their houses in order and made plans to not only maintain employment at the maximum possible, but to aggressively prosecute a campaign whose new business results will largely augment that employment. It has been realized that our workpeople will give expression to their loyalty and give of their substance to the various humane undertakings arising out of the war more readily when opportunity to earn is their portion.

Of the widespread disorganization which the war has brought about in every section of industrial and commercial enterprise, the shipping interests have been perhaps the greatest sufferers, even in spite of the two-fold fact that we are still Mistress of the Seas, and that many of our large steamship lines have found remunerative employment equal to normal times, for the bulk of their fleets in Government service.

Navigation season 1914 has been a disastrous one in its every sense to all connected directly or indirectly with shipping on our inland lakes and rivers, recording as it has, both tragedy and hardship from opening to close. Few there be who will regret its passing, and the ringing down of the curtain which these closing days of November make imperative will be viewed with more or less satisfaction by the varied interests.

Much is likely to happen at the theatre of war between seasons, the individual and combined effects of which will be determining factors from the business, revenue and employment points of view when navigation season 1915 opens. Just what will then have materialized it were idle to assume. There is little need to be fearful however. There is to be no ringing down of the curtain of Empire, therefore no relaxation of effort ashore and afloat by those on whom the burden will most heavily bear.

Marine men, while following eagerly the general development of the conflict, will naturally interest themselves and concentrate their attention more directly on what transpires on the sea, and shall we be prophetic and say that they are unlikely to be disappointed in this feature. Grim and awful as have been the hardship and suffering and the toll of life and limb in the trenches of Northern France and Belgium, there has been and will be the equivalent for those who man our ships. The eternal and nerve-racking vigilance, the devotion to duty, obedience to discipline and conspicuous bravery already so abundantly evident are the features likely to appeal most to the sea-faring community of this Dominion, and fair as the record of the latter has been in times of storm and stress and in the face of impending disaster, there is bound to accrue a still higher conception of what is due from them both as a matter of personal honor, and as an expression of their manhood as citizens of the Empire to which they belong.

GREAT LAKES VESSEL CLASSIFICATION.

WE are pleased to be able to state that to Mr. Acton Burrows, proprietor and editor-in-chief of the Canadian Railway and Marine World, is due the credit for having initiated the discussion on Great Lakes Vessel Classification, which has appeared in the columns of several Old Country shipping journals and from which subscribers have had the benefit of the opinions expressed in our two last issues.

We have just passed the anniversary date of the great sform which sent so many of our lake craft with their crews to destruction and a watery grave and thereby again brought to the front this classification question.

MARINE NEWS FROM EVERY SOURCE

Quebec, Que.—The naval station that has been established for the inspection of incoming and outgoing ships on the St. Lawrence, at River Maheux, Island of Orleans, is to close for the winter months.

Belleville, Ont.—Work has been concluded on the new Government dock at this port by the Randolph Macdonald Co., of Toronto. The contract called for concrete work. The wharf is extensive, projecting far out into the Bay of Quinte. Dredging work has not yet been completed.

Canal Traffic. — Tonnage through Canadian canals up to the end of October shows a decline of 10,000,000 tons up to the first of the month, compared with the same period last year. Most of the decrease is in iron ore through the Soo Canal. The business of the Welland and St. Lawrence Canals increased.

Victoria, B.C.—The steamer Admiral Watson of the Alaska Pacific Navigation Co. is to be withdrawn from service, to permit of her reconstruction at a cost of $115,000. The steamer is to be remodeled and reconstructed on the same lines as the Admiral Evans. She will be laid up for two months.

Sarnia, Ont.—The Dominion Government has started work on the proposed Sarnia harbor, and dredging has commenced, which will take many months to complete. Dredge No. 114 will excavate to a depth of twenty feet of water at least, and will have to remove many feet of mud, as the bay is only a few feet deep.

Toronto, Ont.—The last obstacle in the way of the filling in of the old western channel has been removed by the word received by the Harbor Commission from Ottawa that the Governor-General in Council had approved of the exchange of land at the foot of Bathurst street arranged between the C.P.R. and the Harbor Commission.

Ottawa, Ont.—Engineer Clawson, who was in charge of a party installing aids to navigation on Hudson Bay and Straits, has returned to Ottawa. Ten gas beacons have been erected—three in the Bay and seven along the straits. They are automatic in action and on being turned on in spring will burn for the season. They will greatly facilitate the navigation on the Hudson Bay route.

C. G. S. Montmagny Wreck Decision.—Captain Demers, Canadian Wreck Commissioner, in the Admiralty Court on Nov. 6., gave his judgment in the case of the loss of the Canadian Government steamer Montmagny which was rammed and sunk a few weeks ago by the collier Lingan off Isle Madame, thirty miles below Quebec. He holds the pilot of the Lingan, Francis Gaudreau, responsible with a fine of $200, and further suspends his license until the end of the season. The first mate of the Lingan has had his certificate canceled for ten months, and the captain of the Lingan was reprimanded.

Ottawa, Ont.—Department of Naval Service requires the services of several sea-going tugs for patrol duty on the Atlantic coast during the winter months. Vessels offered must be from 120 to 150 feet long, speed nine to ten knots, and must be fitted with steam winches, having two side drums, each capable of connection and disconnection from driving shaft and free to revolve with brake control. Owners desiring to charter tugs conforming to the above description are requested to communicate with the undersigned, stating terms and full particulars of vessels offered. G. J. Desbarats, Deputy Minister of the Naval Service.

Storstad Case Hearing in January.—The $3,000,000 damages action brought in the Admiralty Court against the owners of the collier Storstad by the Canadian Pacific Railway will be heard some time in January. This was decided before Mr. Justice Dunlop on Nov. 10 at Montreal. The action, originally for $2,000,000 is for the damage suffered by the Canadian Pacific Railway Company when their liner Empress of Ireland sank in the Gulf of St. Lawrence, rammed by the collier, in May last. The amount of the sum demanded was, by the consent of both parties, increased to $3,000,000, to cover compensation paid to the families of the crew who were drowned. It was originally intended to ask for a hearing on the 29th of this month, but a further delay was allowed to permit a commission in England to take the evidence of Captain Kendall, late master of the Empress.

Navigation Lectures.—Captain Charles Eddie, F.R.A.S., superintendent examiner of masters and mates, western division, Vancouver, B.C., delivered the first of a series of free lectures on Nov. 10, on navigation. These have been arranged by the department of marine with a view to providing aspirants for tickets and yachtsmen a course of study without cost. The lectures are given in the Empire Building and the lecture room has been overhauled and fitted with the most modern appliances, such as the new Board of Trade lantern test for sight, electric signalling apparatus, double sextant, deflector, dipping needle and other instruments. The first lecture was on the solar system, with special reference to meteors, one of which fell near the steamer Wyandotte on her trip here. The next lecture will be on universal gravitation. A number of seamen are availing themselves of the Government offer, and intend to follow the course right through.

Montreal, Que.—Work on the construction of the new $800,000 elevator, for which plans have been prepared, will commence as soon as the winter is over. In the meantime the work necessary to prepare for the erection of the great structure will go forward, such as the diversion of the Elgin Basin sewer, the demolition of the elevator office in which the Harbor police have also their headquarters and the excavation necessary for beginning the work. The Harbor Commissioners, Messrs. W. G. Ross, president, Farquhar Robertson and Colonel A. E. Labelle, while in Ottawa recently, discussed with the Minister of Marine and Fisheries the plans of administration and construction for the coming season. It is understood that there will be no radical departures from the plans of expansion and progress which have been followed for some years at the harbor. As steady progress as circumstances warrant will be made in the extending of harbor facilities to take care of the increased tonnage expected next year.

Ottawa, Ont.—Draughtsmen of the Department of Public Works are at work on plans of the new drydock at Halifax. The plans, which will be completed next month, provide for a dock 1,150 feet long and 180 feet wide. It will be specially adapted for repair work on ships of the Royal Navy and is estimated to cost $3,000,000.

Toronto Harbor Inspection.—The Toronto City Council will eat its lunch on Monday, November 23, aboard one of the harbor dredges. The controllers and aldermen will be the guests of the Harbor Board on a tour of the harbor to get a first-hand knowledge of what has been done already in the way of improvements and what is yet contemplated.

Noronic's Hull Alterations. — The steamer Noronic of the Northern Navigation Co. fleet is in drydock at Lorain, Ohio, where some extensive changes are being made to her hull. It is understood that two feet is being added to each side of the boat, and this will be carried up as far as the water-line. The boat at the present time appears to be top-heavy, there being much pig-iron ballast on board to steady her.

Olpmpic Appeal Dismissed.—The House of Lords, sitting as a final court, has dismissed the appeal of the White Star Steamship Co. from the decision of the lower courts in the case of the collision between the company's liner Olympic and the cruiser Hawke on September 20, 1911. The Admiralty asserted that it was not liable, as the Hawke was drawn against the big liner by the latter's suction, and this view was sustained by the lower courts. The Hawke is the light cruiser which was sunk by a German submarine on October 15 last.

The New C. P. R. Princesses.—It is improbable that either of the two new C. P. R. Princesses will be sent out from the Clyde until January. This is the intimation conveyed by Captain J. W. Troup, manager of C. P. R. Coast steamships, when approached as to the probable date on which the two vessels would be ready to set out on the long voyage from Dumbarton to Victoria. The Princess Margaret is practically ready for service, she having undergone her speed trials with remarkable success; but as the Princess Irene was also rapidly nearing completion, he considered it likely that the former vessel would be held on the Clyde until the Irene was ready. Both are coming out via the Panama Canal.

Montreal, Que.—The Red Star liner Zeeland, under charter to the White Star-Dominion line, which took the ground in a blinding snowstorm nine miles below Sorel on Nov. 13, has been safely floated on Nov. 18. The work of dredging out the steamer was done by the Harbor Commissioners' dredges Nos. 5 and 6, and the Public Works Department dredge No. 110, operated under the direction of Mr. Gendron, assistant engineer in Mr. Cowie's department, who followed a plan laid out by Mr. Forneret, chief engineer of the Department of Marine and Fisheries, and Mr. McLean, his assistant.

Halifax and Cunard Line.—S. Cunard & Co., agents at Halifax, N.S., for the Cunard Line, have received advices from the head office of eastbound sailings from Halifax, the liners calling there en route from New York to Liverpool. The Franconia will arrive on the evening of November 29, sailing for Liverpool early the next morning. The Orunda will call on December 14, sailing some hours later, and the Transylvania, the big new Cunarder recently placed in commission, will sail on December 21.

Wireless at Cape Race.—With the lessening in ocean traffic in the north Atlantic due to the near approach of winter, work will begin shortly on the improvement of the Canadian Government wireless telegraph station at Cape Race, on the southeast coast of Newfoundland. It is planned to double the present radius of communication. All the wireless stations on the Newfoundland and Canadian seaboards were taken over by the Admiralty at the outbreak of the European war. Since that time the Cape Race station has been operated to its fullest capacity. As British cruisers will be little needed in these waters during the winter, when all ocean liners take a southerly course, there will be less need of frequent communications. Most of the work at Cape Race can be done without interference with regular operations. Should it be found necessary to stop these for a few days it is proposed to station in the vicinity a Canadian fishery cruiser or a Newfoundland sealing steamer equipped with wireless apparatus.

Japanese Ships to Replace Empresses.—In order to temporarily replace the Empresses in the trade between Hong Kong and Victoria, the C. P. R. will, it is said, charter two Japanese steamships recently launched in Japan. The identity of the two vessels cannot be learned, but it is understood that they will be of 12,000 tons register. Since the Empress of Russia, Empress of Asia, Empress of India, Empress of Japan, and Monteagle were requisitioned by the British Admiralty, the C.P.R. have lost considerable business on the Pacific, and trade built up by that concern has been diverted to other lines. It is understood that the C. P. R. are expecting the early release of the liner Monteagle from Government service, and in that event she would be operated in conjunction with the two large Japanese ships in maintaining a monthly service. The Monteagle together with the Empress of India and Empress of Japan, has been employed in transporting Indian troops from India to Marseilles. The Empress of India and Empress of Japan will probably be retained as auxiliary cruisers.

Victoria, B.C.—Grant Smith & McDonnell, contractors for the Government piers at Ogden Point, are planning to make a start during the present month on the construction of the concrete cribs aboard the floating drydock at Esquimalt. The 8,000-ton floating drydock is now moored at the Esquimalt quarry, acquired by the contractors, and it is at this point that the construction of the cribs will be carried on. The levelling of the foundations of pier 2 for the reception of the cribs is being actively pushed forward. Many thousands of tons of rock have been dumped on the site, and although operations have only been going since the early part of the summer, the bed of the first pier at the shore end is practically ready for the reception of the cribs. Some delay was experienced during the early stages of the contract owing to the fact that the bulk of the material had to be transported across the Gulf from Burrard Inlet, but now that rubble is being shipped from the new quarry at Esquimalt the progress is not much more marked. Since the contractors started operations a grand total of 46,864 tons of rubble have been dumped at t he Ogden Point pier.

AUTOMATIC BOILER CIRCULATOR.

PROPER circulation prevents the forming of an inactive water film on the water played surfaces of furnaces, tubes and combustion chamber, thus making possible the free passage of heat to the surrounding water of the boiler. The metal of the furnace and combustion chamber plates offers practically perfect conductivity for heat, but unless the water be kept in contact with these plates, and in constant motion, it cannot absorb the heat as rapidly as it is produced.

Circulator Details.

The Eckliff is not a machine, depending upon moving parts for its operation. It is merely a system of tubes. It is a thermo-syphon. Specially formed and constructed tubes are bent to conform to the curved surfaces of the furnace. These tubes run vertically from the bottom of the boiler to the tops of the furnaces, and thence horizontally along the furnace tops, being in contact with the

entire length of the furnace, except for one foot at each end, where the tube is bent upward at an angle which causes the water to discharge directly against the tube sheet just above the furnace. The playing of this water against the plates positively prevents, it is claimed, one of the greatest sources of trouble, viz.: the cracking of furnace flange or combustion chamber plate at point where the two are riveted.

The apparatus is all inside the boiler, yet does not interfere in the slightest with free acess to every part. It is absolutely independent of all other parts of the boiler. The only cutting required when installing is the drilling of a 1 inch hole at rear of boiler for insertion of thermometer tube. The circulator is securely fastened to the through stays. The action of the Eckliff is as follows:

Circulator Action.

The water contained in the tubes is held in contact with the hottest portion of the boiler; thus, due to the fact that it cannot liberate itself during the entire journey through the tubes, this water naturally attains a much higher temperature than that of the water surrounding the tubes. Its specific gravity, therefore becomes so much less than that of the surrounding water that it discharges upward from the nozzle, and fresh water takes its place at the intakes at the bottom of the boiler. The movement of the water is so rapid that it scours the surfaces of tubes, furnaces and combustion chamber. Action commences as soon as heat is applied to the furnaces, and nothing can stop it but the cessation of heat.

The thermometer is a check on the efficiency of forced draft. An excess of cold air introduced above the fire causes an immediate lowering of temperatures in the furnace. creates smoke and reduces the efficiency. The moment such a condition occurs, the Eckliff thermometer indicates this drop in temperature, and the air supply should be reduced before the boiler efficiency is appreciably lessened.

The Eckliff Automatic Boiler Circulator Co., Detroit, Mich., are the manufacturers of this apparatus.

THE BRITISH MONITORS.

THE three "Monitors" — Humber, Mersey and Severn, which helped so effectually in checking the German rush on the Belgium coast, represent an entirely new type in the British navy. Built by Vickers, Ltd, at Barrow-in-Furness, the vessels were originally intended for Brazil, from whom, fortunately Great Britain was able to acquire them at the outbreak of hostilities, the leading characteristics being heavy guns combined with light draught; in fact, they may be described as miniature battleships.

The vessels are 265 ft. long, 49 ft. beam, and on a mean draught of 8 ft. 6 in. displace 1,200 tons. They are designed and engined for a speed of 11½ knots, with a nominal radius of 4,000 miles, coal and oil being used as fuel for their Yarrow boilers. They are armed with two 6-in. guns forward and two 4.7-in. howitzers aft, in addition to which they carry four 3-pounders. With their comparatively great beam and less powerful machinery, these vessels can manoeuvre in waters too shallow for a modern torpedo boat destroyer, than which, of course, their armament is vastly heavier. The reduction of engine and boiler weights brings another advantage for their work—the monitors can be well armoured.

Each of the three boats recently acquired has a belt of 2½ in. of armour along a considerable portion of the hull, extending from the upper deck down below the water line. The conning-towers are also heavily armoured, and are well protected from destroyers. Owing to their slight draught of water, these boats also offer a reduced target for torpedo attack, and the hulls are well subdivided. The three vessels are not only well armoured, but are powerfully armed. The two six-inch guns weigh 8½ tons, and throw a shell weighing 100 lb. with a muzzle velocity of 3,000 ft. per second, and with sufficient force to penetrate 25½ in. of iron. Nine of these projectiles can be discharged per gun per minute, and as the effective range of the guns is four miles, considerable damage must have been done in the German trenches, for the Belgian coast is very flat and level. The howitzers are mounted on the upper deck, and throw projectiles weighing 35 lb., while the 3-pounders can fire thirty rounds a minute.

The "Monitor" type originated in the United States, where Captain Ericsen constructed the first of the class for use by the North in the American Civil War. Ericsen thought his armoured ship would be invincible, and it certainly gave a good account of itself. The fight between the Monitor and the Merrimac became a classic example of the use of armoured ships in warfare, and practically settled the line on which armoured battleships were to develop all over the world. Today the monitors have become elaborately fitted and equipped men-of-war. The officers have comparatively spacious cabins, the captain has a steel cabin and a good-sized reception room, the guns are electrically worked, and there is accommodation for the cold storage of meat and perishable food. Owing to the small number of engine-room hands needed, the total complement of each vessel numbers only about 100 all told.

H.M.S. "SEVERN," WHICH PLAYED A PROMINENT PART IN THE RECENT LAND, SEA, AIR AND UNDER-SEA BATTLE OFF THE BELGIAN COAST.

ASSOCIATION AND PERSONAL

A Monthly Record of Current Association News and of Individuals Who Have Been More or Less Prominent in Marine Circles

John T. Matthews, of St. John, N.B., has been appointed inspector of boilers and machinery and of hulls and steamboat equipment at Edmonton, Alta.

William Laurie, Government steamboat inspector, died at his residence, 20 Springfield Ave., Montreal, on Nov. 12, aged 69. Mr. Lawrie was a native of Montreal, and had held the office for 20 years prior to his death.

J. G. Sing, Toronto, who has been district engineer for the Dominion Department of Public Works, for the past ten years, has resigned his position. He will continue his practice as a consulting engineer, and will also act in a similar capacity to the Toronto Harbor Commission.

Administration Change.—The Fisheries branch of the Department of Marine and Fisheries has been transferred to the Department of Naval Service, which has hitherto had charge of the fisheries protection cruisers. The change is purely administrative, since the one minister is in charge of both departments.

Boat Builders' Officers.—The Canadian Association of Boat Builders held its annual meeting recently at the Prince George Hotel, Toronto, with a representative attendance of members, sessions being held both morning and afternoon. Addresses were heard at the afternoon meeting from S. B. Brown, of the Freight and Transport Bureau, the Canadian Manufacturers' Association and Cecil R. Allison, secretary-treasurer of the Motor Boat Club, the latter explaining the improvements being undertaken in regard to the Toronto Harbor. It was decided, after some discussion, that no motor boat show should be held this year. The meeting also decided to take into active membership the marine engine manufacturers of Canada. The election of officers resulted as follows: President, H. W. Going, St. Lawrence Boat & Engine Co., Brockville; first vice-president, Hugh Warnock, Gidley Boat Co., Penetang; second vice-president, M. L. Butler, Brighton, Ont.; secretary, A. F. Pentom, Toronto; treasurer, Claude Rogers, Peterborough Canoe Co.

LICENSED PILOTS.

River St. Lawrence.—Captain Walter Collins, 43 Main Street, Kingston, Ont.; Captain M. McDonald, River Hotel, Kingston, Ont.; Captain Charles J. Martin, 13 Balaclava Street, Kingston, Ont.; Captain T. J. Murphy, 11 William Street, Kingston, Ont.

River St. Lawrence, Bay of Quinte, Murray Canal.—Captain James Murray, 106 Clergy Street, Kingston, Ont.; Capt. James H. Martin, 259 Johnston Street, Kingston, Ont.; John Corkery, 17 Rideau Street, Kingston, Ont.; Captain Daniel H. Mills, 272 University Avenue, Kingston, Ont.

ASSOCIATIONS

DOMINION MARINE ASSOCIATION.
President — L. C. Henderson, Montreal.
Counsel—F. King, Kingston, Ont.

GREAT LAKES AND ST. LAWRENCE RIVER RATE COMMITTEE.
Chairman—W. F. Herman, Cleveland, Ohio.
Secretary—Jas. Morrison, Montreal.

INTERNATIONAL WATER LINES PASSENGER ASSOCIATION.
President—O. H. Taylor, New York.
Secretary—M. R. Nelson, 1184 Broadway, New York.

THE SHIPPING FEDERATION OF CANADA
President—Andrew A. Allan, Montreal; **Manager and Secretary**—T. Robb, 218 Board of Trade, Montreal; **Treasurer**, J. R. Binning, Montreal.

GRAND COUNCIL, N.A.M.E. OFFICERS.
L. B. Cronk, Windsor, Ont., Grand President.
A. F. Hamelin, Montreal, Que., Grand Vice-President.
Neil J. Morrison, P. O. Box 238, St. John, N.B., Grand Secretary-Treasurer.
E. Read, Vancouver, B.C., Grand Conductor.
A. J. Ross, Halifax, N.S., Grand Doorkeeper.
James Gillie and A. E. Kennedy, Kingston, Ont., Grand Auditors.

AUXILIARY LIGHTING PLANT REGULATIONS.

OWNERS of passenger steamers operating out of Detroit and other lake ports foresee that considerable expenditure and sacrifice of deck space will be necessitated in many cases by the rules and regulations prescribed by the Board of supervising Inspectors of Steam Vessels.

The new regulation which is intended to prevent a ship from being left unlighted in case of accident to her hull, is made applicable to all passenger steamers, whether navigating oceans, rivers or lakes, bays and sounds, and provides that "on and after January 1, 1915, all steamers carrying passengers, subject to the inspection of the service, which are provided with plant for electric lighting purposes, the dynamos of which are located below the deep load line, shall have on board an auxiliary plant located above the deep load line capable of thoroughly lighting the vessel in case of emergency."

The new section was suggested as an outgrowth of the loss of the Canadian Pacific steamer, Empress of Ireland, the survivors having reported that the vessel was left in darkness when all the lights were suddenly extinguished as the water reached the dynamos. In contrast, the steamer Titanic is reported to have gone down with all lights burning, this circumstance being credited to her dynamos having been above the deep load line.

Directory of Subordinate Councils for 1914.

Name.	No.	President.	Address.	Secretary.	Address.
Toronto,	1	Chas. M. Arnott.	94 Hanley Street,	A. J. Fisher,	641 Bathurst St., Toronto.
St. John,	2	Wilmot Pitt	Indiantown, P. O.,	G. T. G. Blewett,	36 Murray St., St. John, N.B.
Collingwood,	3	W. T. Rennie,	Collingwood,	Robert McQuade,	P. O. Box 97, Collingwood.
Kingston,	4	S. M. Murray,	20 Rideau St.,	James Gillie,	101 Clergy St., Kingston, Ont.
Montreal,	5	A. F. Hamelin,	3210 Le Tang Street,	O. L. Marchand,	2378 Clark St., St. Vincent de Paul, P.Q.
Victoria,	6	John E. Jeffcott,	Esquimault,	Peter Gordon,	808 Blanchard St., Victoria, B.C.
Vancouver,	7	Andrew T. Roy,	3812 18th Ave., W.,	E. Read,	Room 8, Jones Bldg., Vancouver, B.C.
Levis,	8	Michael Latulippe,	Lauzon,	S. G. Guenard,	Bienville, Levis, P.Q.
Sorel,	9	John Matte,	Sorel,	Al. Charbonneau,	P. O. Box 132, Sorel, P.Qa.
Owen Sound,	10	Wallace Robertson,	1030 4th Ave. West,	James Nicoll,	714 4th Ave., Owen Sound, Ont.
Windsor,	11	Alex. McDonald,	28 Crawford Ave.	Neil Maitland,	221 London St., W., Windsor, Ont.
Midland,	12	Jos. Silverthorne,	Midland,	Jno. A. Murphy,	Midland, Ont.
Halifax,	13	Robt. Blair,	29 Preston Street,	Chas. E. Pearce,	Portland St., Dartmouth, N.S.
Sault Ste. Mari	14	A. E. Lewis,	Box 563, Soo, Ont.,	Geo. S. Biggar,	43 Grosvenor Ave., Sault Ste Marie.
Charlottetown,	15	J. F. McGuigan,	38 Queen Street,	Lem Winchester,	302 Fitzroy St., Charlottetown, P.E.I.
Twin City,	16	Wm. Faloona,	392 Ambrose Street,	Lloyd Williams,	142 Secord St., Fort William, Ont.

STORY OF BRITAIN'S LIGHT-HOUSES.—IV.*

By M. W. Roberts.**

SOME two and a half years after the destruction of the first Eddystone Lighthouse, an Act of Parliament was obtained by Trinity House to rebuild the structure, and a lease was granted to a Captain Lovet to exhibit a light on the tower for 99 years. Captain Lovet intrusted the work to a silk mercer named Rudyard. The selection was not so unwise as at first might appear, for Smeaton himself expressed the opinion that the silk mercer had directed the work in a very efficient manner, and constructed a building well adapted to the purpose for which it was required. Rudyard was assisted by two shipwrights from Woolwich, and he chose the form of a sugar loaf.

He fixed thirty-six iron uprights in the rock to form a circle; inside the circle of iron he fixed oak beams, while the illimate beams were pressed crosswise and bolted together. To weigh this down he raised upon it about five courses of Cornish moorstone clamped with iron, and again two layers of timber. This was the foundation which was raised nine feet above the rock; then the building was carried upward and surrounded with upright timbers well caulked with oakum and covered with pitch. In fact, it was described as "an admirable piece of carpentry," and this is not surprising when we remember that two shipwrights worked with Rudyard.

Their structure was no doubt sound and good. It occupied three years in erection and was completed in 1709, though a light was shown some time earlier. Candles were used for the light, some two dozen in number, and several weighed a couple of pounds apiece. It was part of the lighthouse keeper's duty to snuff these candles. The height of the tower was 92 ft., and for forty-six years its light beamed forth. It was burnt down in 1755, having caught fire from some cause which was never discovered, all the keepers having perished. Once more the Eddystone was without a light.

Smeaton's "Eddystone."

John Smeaton was born in the year 1724 at Austhorpe, near Leeds. His father was a lawyer, and he desired his son to follow the legal profession, but the lad showed a liking for mechanical pursuits quite early in his life; and, it is said, that when quite a boy he was found at the top of a barn belonging to his father fixing up a little machine, and that he used to watch mechanics at their work and delight in asking them questions, and eventually he became a mathematical instrument maker. Smeaton having accepted the appointment to build the new Eddystone, visited the rock several times to measure the surface; then he proceeded to construct a model of it.

On August 3, 1756, he traced out a portion of his plan on the rock itself, which slopes to the south-west, and a month later he caused two steps and several recesses for the dovetail joints to be roughed out on it. The men could never work more than six hours at a time owing to the rough weather and tide, which interruptions were frequent. The stones were prepared on shore according to drafts, weighing about one to two tons each block, and were of Portland oolite and of granite. Sometimes the weather permitted to work by torchlight, a store vessel being anchored close by, but at last the weather become too bad in the month of November, so that they left the wild Eddystone for the winter; meantime the preparing of the stone went on ashore.

On June 12, 1757, the first stone, weighing two tons and a quarter, was firmly set in its proper place. The stones were then dovetailed into the lower part of the solid rock, and several courses of stones, strongly cemented and ingrafted together, were built upon them. When six courses had been placed the building had risen above the usual wash of the water, and progress was made quickly. At a height of about 13 feet, the staircase was started, and the tower may be considered solid to the floor of the first room, some 35 feet from the base: four rooms then rose one above the other, a gallery came next, and finally the lantern. The walls of the rooms were two feet thick, and their ceilings were arched. The tower was 26¾ feet in diameter at its base, and tapered to 15 feet in its total height of 85 feet.

Like Rudyard's tower, the light was supplied by two dozen candles, some of which were two pounds weight, the light showing for a distance of 13 miles. In 1810, oil lamps were introduced, and in 1845 an apparatus with a lens or lenses. The structure was completed on the 9th of October, 1759. It stood 123 years, defying storms and seas, wind and tide, when eventually it had to be taken down owing to the rock being undermined, but the old stump is standing to this day, as a monument.

A new tower was considered necessary, and was erected on another portion of the reef, the new structure being built by Sir James N. Douglas, F.R.S., and completed in 1882. Smeaton's celebrated edifice was carefully demolished to the height of the first room, and was re-erected as a monument on Plymouth Hoe.

* From a recent lecture on the subject.
**Chairman, Liverpool Pilots' Association.

VESSEL NAMES.

IT has often been a matter of wonderment to the uninitiated where such names as Aquitania, Lusitania, Andania, etc., were obtained, and for this reason it is interesting to note that Aquitania is the ancient Latin name of the most south-western of the three divisions of Gaul. Lusitania was a Roman province, roughly corresponding with modern Portugal, Morocco and Western Algeria were once known as Mauretania, Carmania was a great province of Asia lying north of the Persian Gulf, Campania in ancient geography a region in Italy, Carpathia is obviously derived from the Carpathian Mountains, and Pannonia was a great north-eastern province of the Roman Empire. The steamer Ultonia takes its name from Ulster, Ultonia being the Latinized version; Saxonia is a Latinized name formed from Saxon; Ivernia is one of the ancient forms of Ireland; Laconia a name generally applied to a south-eastern corner of Greece, and Franconia is a loosely connected aggregate of districts and territories lying chiefly in the basins of the Rhine, the Main and the Neckar.

All these names are of vessels plying elsewhere than to Montreal, but the same scheme of nomenclature has been carried out on vessels calling at Canadian ports, Alaunia taking her name from a variety of sources, Alaunia being a town, the name of an ancient people found both in Asia and Europe, and Alaunia the Celtic name of a river in Roman Britain. The Andania was called after an ancient town in Peloponnesia; Ascania is an island in the Greek Archipelago, as well as of a region around a lake in Asia Minor, whilst Ausonia is a town in Italy, as well as the ancient name of Italy.

CANADA'S WINTER PORTS.

ON account of the important part the ports of Halifax and St. John will play this winter in connection with Canada's military activities, special precautions are being taken by the Marine Department to ensure safety of navigation at these points. J. G. McPhail, commissioner of lights, left for Halifax on November 10, to see that lights, buoys and other navigation aids at the winter ports are kept in proper order. This work is generally left to the departments's agent at Halifax, but it is decided to take special precautions this season.

The Naval Service Department is chartering a number of sea-going tugs for patrol duty on the Atlantic coast during the winter months. Vessels of ten-knot speed and about 150 feet length are being advertised for.

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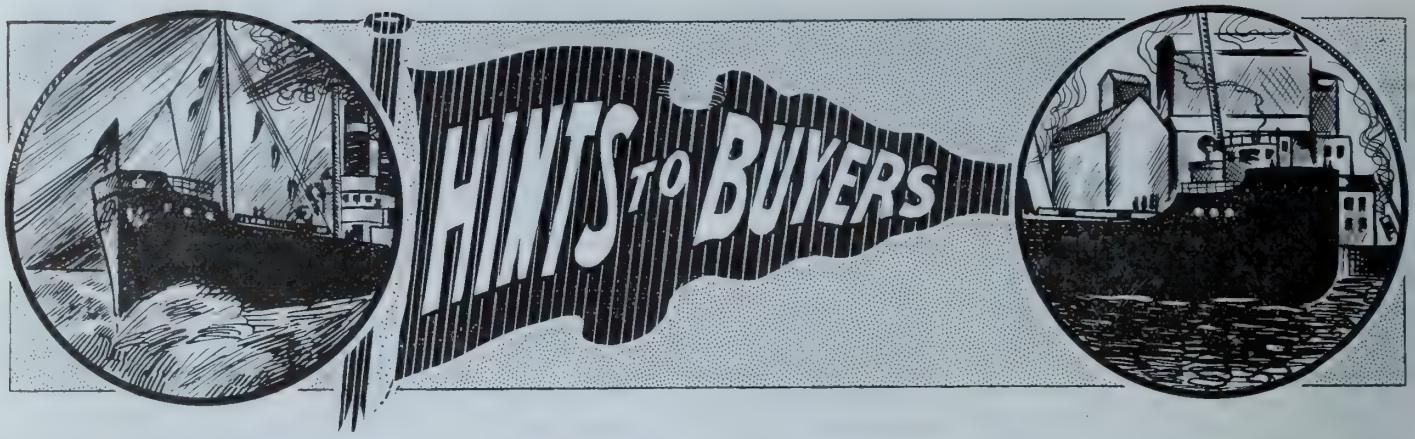

CIRCULATES IN EVERY PROVINCE OF CANADA AND ABROAD

MARINE ENGINEERING of Canada

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Description of Canadian Customs Cruiser "Margaret"

It will be easily apparent from a careful study of the accompanying article that neither expense, nor the ingenuity and handicraft of the marine engineer and naval architect in their most up-to-date practice have been lacking in producing this vessel for her particular service.—Data, courtesy of "Engineering."

THE deck and general accommodation arrangements were the special features in the article which appeared in our November issue, relative to the Canadian Customs Cruiser Margaret. In the present instance, particular reference is made to the propelling and auxiliary machinery equipment installed in the vessel.

Propelling Machinery.

The propelling machinery consists of two sets of vertical reciprocating engines having a combined indicated horsepower of 2,000 at 180 revolutions per minute. The cylinder diameters are 14 in., 23 in., and 38 in., and the stroke is 24 in. The high pressure and intermediate-pressure cylinders are fitted with piston valves, and the low pressure cylinder with a flat double-ported valve with relief rings on the back. The valve gear is of the Stephenson type, with double bar-links, and is reversed by a direct-acting engine, built by Scott, MacTaggart & Co. Each main engine has an independent steam turning engine, while alternative hand-gear is fitted.

Condensers and Pumps.

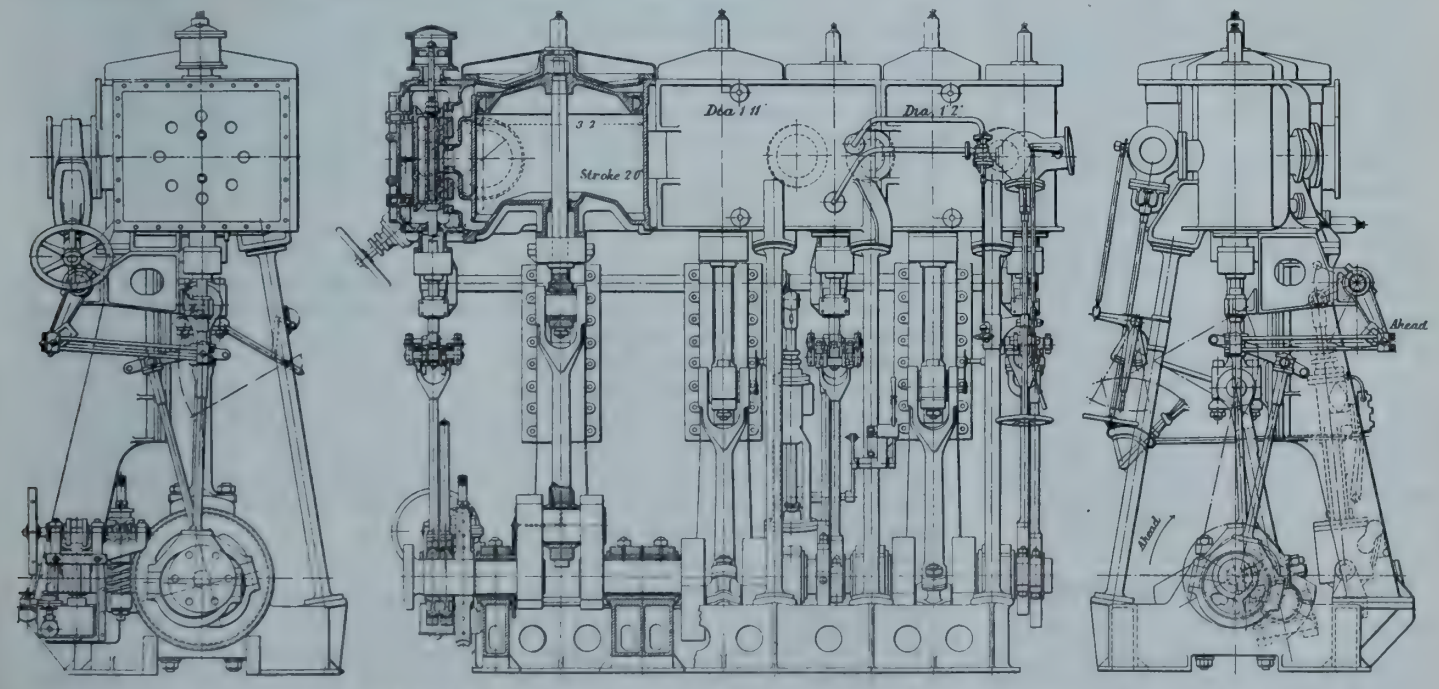
Each engine has also a separate condenser with steel body and cast iron ends. The tubes and tube plates are of brass. Circulating water is delivered to the condensers by two independent centrifugal pumps, driven by vertical open type engines. The pumps and engines were built by Messrs. Gwynne. In the engine room there is a 15-ton evaporator by G. & J. Weir, which is used for make-up feed purposes, the vapor pipe being led direct to the port condenser. The two air pumps are of the Weir monotype, having their suctions connected to the condensers, and each delivering to feed filter tanks in the engine room. The main and auxiliary feed pumps are of the Weir type, their steam supply being automatically controlled by a lever actuated from their common float tank.

The main feed pump is arranged to draw from the feed filter tanks, reserve feed tank, or direct from the condenser and deliver through a Rankine filter, then through a Weir surface feed heater to the main feed valves on the boilers. The auxiliary feed pump suctions are as above, but the pump delivers direct to the auxiliary feed valves on the boilers. The other auxiliary machinery in the engine room comprises bilge pumps, fresh water pump, general service pump, and sanitary pump. These pumps are all of Weir make, and the services they perform were dealt with in our previous article.

The electric lighting and power plant consists of two 15-kw. 110-volt steam sets, by Clark, Chapman & Co. In addition to furnishing lighting and power for fans, etc., the generating sets supply current for the wireless-telegraphy outfit.

Boiler Room.

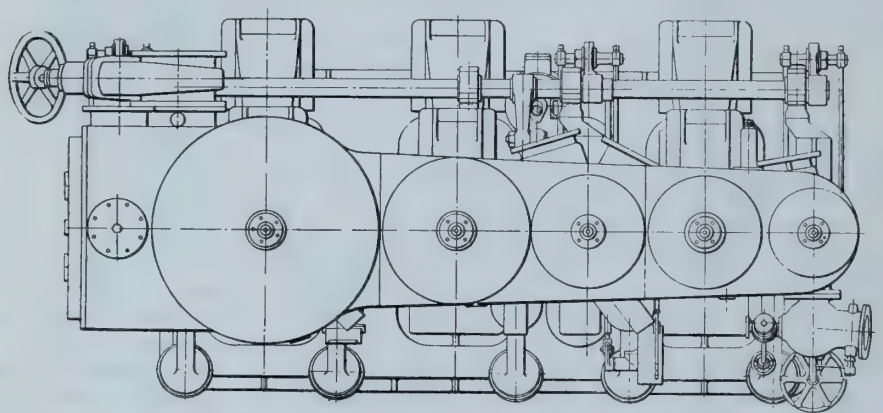
The boiler room is reached from the engine room through an air lock, controlled at the engine room bulkhead by a Mechan's patent sliding door. The two boilers are of the water tube type, coal fired. The working pressure is 220 lb. per sq. in., the heating surface being 3,297 sq. ft., and the grate surface 60.4 sq. ft. in each case. Each boiler is fitted with Mumford's feed regulating gear and Madan's patent fire-extinguishers. Air is supplied to the stokehold by two Brotherhood fans and engines of the enclosed type. A Sellar's self-acting feed injector is fitted in the stokehold, and arranged to draw from the reserve feed tank, and deliver to the boilers through the auxiliary feed valves. The steam pipes are of solid drawn steel, the main steam ranges having expansion joints. The stokehold is provided with a See's patent ash ejector, taking its water supply from the general service pump. The bunkers have a total capacity of 200 tons, giving a range of nearly 2,000 miles at full speed, and about 4,000 miles at an economical speed.



ELEVATIONS OF ONE SET OF PROPELLING MACHINERY, CANADIAN CUSTOMS CRUISER "MARGARET."

Trial Particulars.

The Margaret was launched on January 14 last, in an unusually advanced condition; the machinery and accommodation being so nearly completed that a preliminary six-hour trial was carried out on January 20. The progressive trials were held on January 25. Four runs were made at varying speeds from 6 knots up to 15¼ knots, the load consisting of 157 tons on a draught of 10 ft. 2 in. The results obtained were very satisfactory. Forced draught was only used on the last two runs at 13¼ and 15¼ knots. Consumption trials were afterwards carried out at 12¾ and 8¾ knots.



PLAN OF ONE SET OF PROPELLING MACHINERY, CANADIAN CUSTOMS CRUISER "MARGARET."

On January 29 the official full power trial was run consisting of six hours at full power. Six runs each of one mile in the middle of the six hours showed a mean speed of 15.415 knots, with the engines running at 187½ revolutions per minute and developing 2,050 indicated horse power. The mean speed over the whole six hours was 15.37 knots, the mean revolutions per minute 186¾, and the indicated horse power 2,050. The total load carried on this trial was 140 tons on an extreme draught of 10 ft. 1 in.

Circle trials were carried out on the completion of the official full power trial, and the results were exceptional trial, and the results were exceptional for a boat of this size and class. The circle with both engines full ahead on each turn in two minutes each way, and the diameter of the circle measured only about two lengths. Gun trials and electric trials carried out at a later date proved satisfactory in every way. The trials were conducted under the direct supervision of Mr. Warren, the surveyor to the Canadian Government.

WEST ST. JOHN DOCK OPENING.

THE opening of the new docks at West St. John, N.B., on December 10, was marked by some announcements of special interest. Hon .Robert Rogers gave definite promise that the new drydock will be built according to the same plans as those at Halifax and Esquimault, and of a length of 1,150 feet. He further stated that the development of the port of St. John would continue as rapidly as the demands of the traffic require, although no new work will be undertaken during the progress of the war.

Hon. J. D. Hazen announced that the lowest tenderer for the extension of the breakwater to Partridge Island was the Maritime Dredging & Construction Co., and that this work would be one of the first to commence as soon as conditions improved.

On behalf of the Canadian Pacific Railway Co., G. M. Bosworth, vice-president, told of their purchase of two new steamers, and the charter of three more, each by the C. P. R. and the Allan Line. He promised enough business to keep the port busy during the winter.

The visitors were the guests of the Board of Trade at luncheon in the Union Club at one o'clock, and afterwards crossed the harbor in the Government cruiser Curlew to the new docks, where Miss Frances Hazen cut the ribbon barrier and declared the docks open. Speeches were given in the new warehouse in the presence of a crowd of some 3,000 persons. Speaking of the additions to the C. P. R. fleet, Mr. Bosworth said:

"Although the C. P .R. has been obliged to turn over to the British Admiralty for the good of the Empire many of its best and largest steamships, we do not expect that this will materially interfere with the business which we will do in this port the present winter. Our passenger traffic may be somewhat curtailed, although we have arranged in connection with the Allan Line to cooperate from here a weekly service of the passenger steamers to Liverpool. In a few months the s.s. Metagama, a sister ship of the Missanabie, will be seen in St. John, and I might say further that we have in the last two days been able by great good fortune to acquire two very fine passenger and freight steamers now building in Scotland.

"Those steamers are larger than the Missanabie, carry a greater number of passengers and a larger amount of freight, and while delivery of them will not be made until after close of winter navigation, you will see them here another year. I may say further that we have lately chartered three large freight-carrying steamers, which will run to St. John this winter. The first has already left England for this port. The Allan Line have also chartered three large cargo carriers, one or more of which will be seen here during the winter. You will be pleased, therefore, to know that, although the demands of the British Admiralty have taken from us a number of the steamers heretofore well known in St. John, we have to a large extent overcome this disadvantage in the reduction of our ocean fleet."

C. G. S. "SHARON" BELIEVED LOST

ALTHOUGH no details have been received by the Railways and Canals Department of the loss of the Government steamer "Sharon" in the Atlantic, the story of her sinking with all the crew is now believed to be correct.

All that is known of the Sharon is that she is over a month overdue and the report that she has been sunk by a mine in the Irish Sea is only a conjecture. The vessel is one which was used to carry supplies to Port Nelson last summer and was then chartered to the Dominion Iron and Steel Co. for the winter. She left Sydney for Newport, Wales, with a cargo of steel and the last heard of her was a wireless despatch after she had left Newfoundland. She was a vessel of about 3,000 tons.

The Sharon was commanded by Captain Cochrane. Nearly all her officers and engine-room hands were Englishmen, but the majority of the crew belonged to North Sydney or were shipped there.

A. D. Swan, the well-known consulting engineer, of Montreal, has returned from England, where he had been engaged for the past two months in connection with the new Bristol docks. Mr. Swan was engaged by the Bristol Docks Committee as expert witness and engineering adviser in connection with the arbitration. The Bristol Docks Committe won their case.

Welland Canal Closed.—The steamer Carleton arrived at Port Colborne on December 18 from Tonawanda to go into winter quarters. She is the last steamer to arrive this year.

Canadian Rules for Steamship Life Saving Appliances

No Revision of Rules for Life-Saving Appliances Having Been made for Some Years by the Department of Marine and Fisheries, and Those at Present in Force Being Below the Standard Required by Other Governments as Regards Foreign Going Ships It Has Been Determined by a Recent Order-in-Council That the Rules Which Constitute the Substance of this Article, Will Apply as From April 1, 1915.

THE revision of the rules relating to life saving appliances on steamships has been engaging the attention of the Department of Marine and Fisheries for some considerable time. The work, however, is now complete and, in the various details submitted, indicates that for foreign going steamships the regulations are the same as those of the British Board of Trade and, for coasting and inland vessels they are such as will ensure as high degree safety as is practicable.

Classification and Definition.

For the purpose of these rules steamships shall be arranged in the following classes, under the headings "Foreign-going," "Coasting," and "Inland," which terms shall have the following definitions:—

The expression "Foreign-going steamship" shall include every steamship employed in trade or going between some place or places in Canada and some place or places situate beyond the limits as set out hereafter.

The expression "Coasting steamship" shall include every steamship employed in trade or going between some place or places on the eastern coast of Canada and some place or places on such coast not farther north than Cape Chidley, or in Newfoundland, Labrador, St. Pierre, Miquelon, or on the eastern coast of the United States of America not farther south than Charleston in the State of South Carolina; or between some place or places on the western coast of Canada and some place or places on such coast or on the western coast of the United States of America not farther south than San Diego in the State of California nor farther north than Cape Spencer in the territory of Alaska, or any bay or inlet having its entrance on the eastern side of said Cape.

The expression "Inland steamship" shall include every steamship employed in trade or going between some place or places situate on any of the rivers, lakes or other navigable waters within Canada, or between Canada and the United States, except salt water bays and gulfs on the sea coast, and some place or places in Canada or the United States situate on such waters. Steamships trading in the St. Lawrence River when not proceeding seaward further than the meridian through Father Point shall be included under the heading of "Inland steamships."

Foreign-Going.

Class I.

Foreign-going steamships certified to carry passengers.

Class II.

Foreign-going steamships not certified to carry passengers.

Coasting.

Class I.

Steamships certified to carry passengers anywhere within the Coasting Limits.

Class II.

Steamships certified to carry passengers within certain specified limits of the coasting trade, viz., on specified passages along the coasts of Canada and continuous coasts of the United States of America, where the maximum distance between regular ports of call of such trip or voyage does not exceed 100 miles, and the route throughout is restricted to not more than 15 miles off shore.

Class III.

Steamships certified to carry passengers within the limits of certain specified sheltered waters, or on short excursions to sea beyond the limits of such sheltered waters, between the 1st May and 30th September in fine weather.

Class IV.

Steamships trading or working within the Coasting Limits but not certified to carry passengers including tugs, steam fishing vessels, steam lighters, dredgers, steam hoppers, hulks, tow barges, and such vessels.

Inland.

Class I.

Steamships certified to carry passengers anywhere within the Inland Limits.

Class II.

Steamships certified to carry passengers within specified limits of the Inland Trade, viz., on specified passages along the coasts of the Great Lakes, Georgian Bay, Great Slave Lake, Lake Winnipeg, or the River St. Lawrence seaward of the River Saguenay, where the maximum distance between regular ports of call of such trip or voyage does not exceed 100 miles and the route throughout is restricted to not more than 15 miles off shore, also on any other lakes or rivers not so specified, and not of the restricted width as set out in Class III. hereafter.

Class III.

Steamships certified to carry passengers on sheltered Bays and Lakes and Rivers, within the Inland Limits, the greatest width of which lakes, or rivers does not exceed two miles, or on short excursions beyond the limits of such waters between 1st May and 30th September in fine weather.

Class IV.

Steamships trading or working within the Inland Limits but not certified to carry passengers, including tugs, steam fishing vessels, steam lighters, dredgers, steam hoppers, hulks, tow barges and such vessels.

Foreign-Going.

Class I.

Rules for Foreign-going Passenger Steamships.

Rule A—A ship of this class shall carry lifeboats in such number and of such aggregate capacity as shall be sufficient to accommodate the total number of persons which the ship is certified to carry.

Provided that if the aggregate capacity of the lifeboats carried by a ship of this class exceeds the capacity required by General Rule 2, the Board may allow one or more life rafts conforming to the conditions laid down in that Rule to be carried in lieu of any of the remaining lifeboats which would otherwise be required by the present rule.

The master or owner of a ship of this class claiming to carry on any voyage fewer lifeboats than will provide sufficient accommodation for all the persons for which the ship is certified, must declare before the Collector or other Chief Officer of Customs, before the time of clearance, that the lifeboats actually carried will be sufficient to accommodate all persons that will be carried at any time during the voyage to foreign ports and the voyage back to Canada.

Rule B—Subject to the provisions of General Rule 20 (1), a ship of this class shall be provided, in accordance with its length, with such number of sets of davits of approved form as is specified in Column A, of the table in Appendix I. and they shall be suitably placed to the satisfaction of the Board. Provided that no ship shall be required to have a larger number of sets of davits than the number of boats required to accommodate the total number of presons which is carried, or which the ship is certified

to carry: Provided also, that appliances or arrangements at least as effective as davits for launching boats may be accepted by the Board in lieu of davits; Provided also, that the Board may, where it appears to them necessary, having regard to the height at which the boats are carried above the deep load line, and to other circumstances of the case, require a ship of this class to carry, in lieu of, or in addition to davits, some other approved form of launching appliances, or such arrangements for launching boats as may be, in their opinion, effective.

Rule C—(1)—Each set of davits shall have a life boat of Class 1 attached to it, and of these lifeboats at least the minimum number specified in column B of the table in Appendix I shall be open boats.

(2) Any additional lifeboats which may be required to make up the total life boat accommodation, may be boats of Class 1 or Class 2.

Rule D.—If the ship is under 400 feet in length, at least twelve approved lifebuoys shall be carried; if 400 feet or over, but under 600 feet, at least eighteen approved lifebuoys shall be carried; if 600 feet or over, but under 800 feet, at least twenty-four approved lifebuoys shall be carried; and if 800 feet or over, at least thirty approved lifebuoys shall be carried.

Rule E.—One approved life-jacket shall be carried for each person on board, and in addition a sufficient number of approved life-jackets of a size suitable for children.

Rule F.—The Board may, from time to time, schedule certain voyages between specified ports or places outside Canada as being, for the purpose of these rules, voyages of a nature similar to one or other of the classes of voyage within Coasting Trade limits provided for in the Rules.

If a foreign-going passenger steamship is permitted by the terms of the passenger certificate to carry, between specified ports or places abroad, a number of passengers in addition to the number allowed when the ship is proceeding to sea from Canada, and such voyage has been scheduled in accordance with the provisions of this rule, that ship shall so far as concerns the additional passengers carried between those ports or places, comply with the Rules applicable to the Class of Coasting Trade voyage to which the voyage has been scheduled as similar.

Class II.

Rules for Foreign-going Steamships not certified to carry passengers.

Rule A.—A ship of this class shall carry on each side of the ship lifeboats of Class 1 in such number and of such capacity as will accommodate all persons on board: Provided that if the total number of lifeboats required under this rule exceeds two, a boat of Class 3 may be carried in lieu of one of them; and if the number exceeds three, one or two boats of Class 3 may be carried in lieu of the same number of lifeboats.

Rule B.—The lifeboats and boats of Class 3 shall be attached to davits, or other approved appliances at least as effective as davits shall be provided in lieu of davits.

Rule C.—At least six approved lifebuoys shall be carried, together with one approved life-jacket for each person on board.

Coasting Trade.

Class I.

Rules for Steamships certified to carry passengers anywhere within the Coasting Limits.

Rule A.—Subject to the provisions of General Rule 20 (1), a ship of this class shall be provided in accordance with its length with such number of sets of davits of approved form as is specified in Column A of the Table in Appendix I, and they shall be suitably placed to the satisfaction of the Board; each set of davits shall have a lifeboat of Class 1 attached to it: Provided that no ship shall be required to have a larger number of sets of davits than the number of boats required to accommodate the total number of persons which the ship is certified to carry: Provided also, that appliances or arrangements at least as effective as davits for launching boats may be accepted by the Board in lieu of davits.

The lifeboats attached to davits may be either open or pontoon lifeboats, but no ship shall carry attached to davits a number of open lifeboats less than that specified in accordance with its length in Column B of the Table in Appendix I.

Rule B.—In a ship of this class the minimum aggregate capacity of the life boats attached to davits shall be as specified in the Table in Appendix II., provided that in the case of a ship launched before the 1st day of April, 1915, if the lifeboats attached to davits do not provide the total capacity specified in the Table, additional life-boats shall be carried to make up that capacity; and they shall be stowed alongside or beneath the lifeboats attached to the davits, or in some other manner which is, in the opinion of the Board, as satisfactory: Provided that no ship at whatever date launched shall be required to carry lifeboats of an aggregate capacity greater than is required to accommodate the total number of persons which the ship is certified to carry.

Rule C.—Subject to the provisions of General Rule 20 (3), if the lifeboats carried do not provide sufficient accommodation for the total number of persons which the ship is allowed by her ordinary passenger certificate to carry, approved life-rafts, approved buoyant d seats, or other approved buoyant apparatus shall be carried so that they, together with the lifeboats, shall provide sufficient accommodation for the total number of persons for which the ship is ship is so certified.

Rule D.—Where a ship of this class has a special passenger steamship's certificate allowing her, when engaged upon daylight voyages between the 15th day of May and the 30th day of September, inclusive, to carry a number of persons in excess of the total number of persons allowed by her ordinary passenger certificate, the lifeboats, approved life-rafts, approved buoyant deck seats, or other approved buoyant apparatus carried shall provide sufficient accommodation for 80 per cent. of the number allowed by such special passenger steamship's certificate, or for the total number of persons allowed by the ordinary passenger steamship's certificate, whichever number is the greater.

Rule E.—If the ship is under 200 feet in length, at least six approved lifebuoys shall be carried, and if 200 feet in length or over, at least ten approved lifebuoys shall be carried. One approved life-jacket shall be carried for each person on board, and in addition a sufficient number of life-jackets of a size suitable for children.

Class II.

Rules for Steamships Certified to carry Passengers within Certain Specified Limits of the Coasting Trade, viz., on Specified Passages along the Coasts of Canada and Contiguous Coasts of the United States of America, where the maximum distance between Regular Ports of Call of Such Trip or Voyage does not exceed 100 miles and the Route throughout is restricted to not more than 15 miles off shore.*

Rule A.—A ship of this class shall, subject to the following proviso, comply with the provisions of Class I, Coasting Trade:—

Provided that a ship of this class, when engaged:—

(a) on certain voyages near the coasts of Canada, specially scheduled by the Board for this purpose, or

(b) on excursions, specially scheduled by the Board for this purpose, between the 1st June and the 31st August, inclusive, shall not be required to carry more sets of davits, or lifeboats of a greater aggregate cubic capacity than are respectively specified in the Table in Appendix III. Each set of davits shall have an open life boat of Class 1 attached to it.

*NOTE.—Where the route of a vessel is such as to be partly in open water and partly in passages or straits or rivers not exceeding five miles in width, the entrance to and exit from such may be considered as ports of call, and the distance run therein need not be taken into account in determining the vessel's classification.

Class III.

Rules for Steamships Certified to carry Passengers Within the Limits of Certain Specified Sheltered Waters, or on Short Excursions to Sea Beyond the Limits of Such Sheltered Waters Between the 1st May and 30th September in Fine Weather.

Rule A.—Subject to the provisions of General Rule 20 (1), a ship of this class not less than 60 feet in length shall be provided in accordance with its length with such number of sets of davits of approved form and boats of the minimum aggregate cubic capacity as is specified in the Table in Appendix IV., and they shall be suitably placed to the satisfaction of the Board; each set of davits shall have an approved boat attached to it: Provided, that no ship shall be required to have a larger number of sets of davits, or greater cubic capacity in boats than is required to accommodate the total number of persons which the ship is certified to carry: Provided also that appliances or arrangements at least as effective for launching boats may be accepted by the Board in lieu of davits.

Rule B.—A ship of this class having a length of less than 60 feet, but in excess of 40 feet, shall carry one approved boat of a cubic content of not less than 50 cubic feet, so stowed that it can be readily placed in the water on either side of the ship. The method of stowage and the means of putting the boat overboard shall be to the satisfaction of the Board.

Rule C.—Subject to the provisions of General Rule 20 (3), such additional boats, or such number of approved life-rafts, approved buoyant deck seats, or other approved buoyant apparatus shall be provided as shall be sufficient (together with the boat accommodation required under Rule A or Rule B) for 70 per cent. of the total number of persons for which the vessel is certified. When in a ship, not in excess of 40 feet in length, a boat cannot be carried, approved life-rafts, or other approved buoyant apparatus shall be provided for at least 70 per cent. of the persons for which the ship is certified.

Rule D.—If the ship is under 60 feet in length at least two approved life-buoys shall be carried; if over 60 feet and under 120 feet in length at least four approved life-buoys shall be carried, and if over 120 feet at least six approved lifebuoys shall be carried. One approved life-jacket shall be carried for each person on board and in addition a sufficient number of approved life-jackets of a size suitable for children.

Class IV.

Rules for Steamships trading or working within the Coasting Limits, but not certified to carry Passengers, including Tugs, Steam Fishing Vessels, Steam Lighters, Dredgers, Steam Hoppers, Hulks, Tow Barges and such Vessels.

Rule A.—A ship of this class having a length of 100 feet or over, and certified to trade or work anywhere within the Coasting Limits, shall carry a boat or boats on each side of the ship as shall be sufficient to accommodate all persons on board. The boats shall be attached to davits and one of them may be a boat of Class 3, the remaining boats shall be life boats of Class 1.

Rule B.—A ship of this class having a length of less than 100 feet, certified to trade or work anywhere within the Coasting Limits shall carry at least one open lifeboat of Class 1 so stowed that it can be readily placed in the water on either side of the ship, and of sufficient capacity to accommodate all persons on board. The method of stowage and means of putting the boat into the water shall be to the satisfaction of the Board.

Rule C.—A ship of this class certified to trade or work only within the limits of certain specified sheltered waters or within certain short specified distances off such sheltered waters shall carry at least one boat sufficient to accommodate all persons on board. The method of stowage and means of putting the boat into the water shall be to the satisfaction of the Board.

Rule D.—A ship of this class if 100 feet or over in length shall carry at least four approved lifebuoys, and if under 100 feet at least two approved lifebuoys. An approved life-jacket shall be carried for each person on board.

Inland Trade.

Class I.

Rules for Steamships certified to carry Passengers anywhere within the Inland Limits.

Rule A.—Subject to the provisions of General Rule 20 (1), a ship of this class shall be provided in accordance with its length with such number of sets of davits of approved form as is specified in Column A of the Table in Appendix I., and they shall be suitably placed to the satisfaction of the Board; each set of davits shall have a lifeboat of Class 1 attached to it: Provided that no ship shall be required to have a larger number of sets of davits than the number of boats required to accommodate the total number of persons which the ship is certified to carry: Provided also that appliances or arrangements at least as effective as davits for launching boats may be accepted by the Board in lieu of davits.

The lifeboats attached to davits may be either open or pontoon lifeboats, but no ship shall carry attached to davits a number of open lifeboats less than that specified in accordance with its length in Column B of the Table in Appendix I.

Rule B.—In a ship of this class the minimum aggregate capacity of the lifeboats attached to davits shall be as specified in the Table in Appendix II.: Provided that in the case of a ship launched before the 1st day of April, 1915, if the lifeboats attached to davits do not provide the total capacity specified in the Table additional life-boats shall be carried to make up that capacity; and they shall be stowed alongside or beneath the lifeboats attached to the davits, or in some other manner which is, in the opinion of the Board, as satisfactory.

Provided that no ship at whatever date launched shall be required to carry lifeboats of an aggregate capacity greater than is required to accommodate the total number of persons which the ship is certified to carry.

Rule C.—Subject to the provisions of General Rule 20 (3), if the lifeboats carried do not provide sufficient accommodation for the total number of persons which the ship is allowed by her ordinary passenger certificate to carry, approved life-rafts, approved buoyant deck seats, or other approved buoyant apparatus shall be carried, so that they, together with the lifeboats, shall provide sufficient accommodation for the total number of persons for which the ship is so certified.

Rule D.—Where a ship of this class has a special passenger steamship's certificate allowing her, when engaged on daylight voyages between the 15th of May and the 30th of September, inclusive, to carry a number of persons in excess of the total number of persons allowed by her ordinary passenger certificate, the lifeboats, approved life-rafts, approved buoyant deck seats, or other approved buoyant apparatus carried shall provide sufficient accommodation for 80 per cent. of the number allowed by such special passenger steamship's certificate, or for the total number of persons allowed by the ordinary passenger steamship's certificate, whichever number is the greater.

Rule E.—If the ship is under 200 feet in length, at least six approved lifebuoys shall be carried, and if 200 feet in length or over, at least ten approved lifebuoys shall be carried. One approved life-jacket shall be carried for each person on board, and in addition a sufficient number of life-jackets of a size suitable for children.

Class II.

*Rules for Steamships certified to carry Passengers within Specified Limits of the Inland Trade, viz., on Specified Passages along the Coasts of the Great Lakes, Georgian Bay, Great Slave Lake, Lake Winnipeg or the River St. Lawrence seaward of the River Saguenay, where the maximum distance between regular ports of call of such trip or voyage does not exceed 100 miles and the route throughout is restricted to not more than 15 miles off shore, also on any other lakes or rivers not so specified, and not of the restricted width as set out for Class III. hereafter.**

Rule A.—Subject to the provisions of General Rule 20 (1), a ship of this class shall be provided in accordance with its length with such number of sets of davits of approved form as is specified

*Note.—Where the route of a vessel is such as to be partly in open water and partly in passages or straits not exceeding five miles in width, the entrance to and exit from such may be considered as ports of call, and the distance run therein need not be taken into account in determining the vessel's classification.

in the Table in Appendix III., and they shall be suitably placed to the satisfaction of the Board; each set of davits shall have an open lifeboat of Class 1 attached to it: Provided that no ship shall be required to have a larger number of sets of davits than the number of boats required to accommodate the total number of persons which the ship is certified to carry: Provided also, that appliances or arrangements at least as effective as davits for launching boats may be accepted by the Board in lieu of davits.

Rule B.—In a ship of this class the minimum aggregate capacity of the lifeboats attached to davits shall be as specified in the Table in Appendix III.: Provided that in the case of a ship launched before the 1st day of April, 1915, if the lifeboats attached to davits do not provide the total capacity specified in the table additional lifeboats shall be carried to make up that capacity; and they shall be stowed alongside or beneath the lifeboats attached to davits, or in some other manner which is. in the opinion of the Board, assatisfactory: Provided that no ship at whatever date launched shall be required to carry lifeboats of an aggregate capacity greater than is required to accommodate the total number of persons which the ship is certified to carry.

Rule C.—A ship of this class having a length of less than 60 feet shall carry one approved lifeboat of Class 1 of a cubic content of not less than 80 feet, so stowed that it can be readily placed in the water on either side of the ship. The method of stowage and the means of putting the boat overboard shall be to the satisfaction of the Board.

Rule D.—Subject to the provisions of General Rule 20 (3), if the lifeboats carried do not provide sufficient accommodation for the total number of persons which the ship is allowed by her ordinary passenger certificate to carry approved life rafts, approved buoyant deck seats, or other approved buoyant apparatus shall be carried so that they, together with the lifeboat accommodation required under Rule B or Rule C, shall be sufficient for 50 per cent. of the number of persons the ship is certified for.

Rule E.—If the ship is under 60 feet in length at least two approved lifebuoys shall be carried: if over 60 feet and under 120 feet in length at least four approved lifebuoys shall be carried, if over 120 feet and under 200 feet in length, at least six approved lifebuoys shall be carried, and if over 200 feet at least eight approved lifebuoys shall be carried. One approved life-jacket shall be carried for each person the ship is certified for, and in addition a sufficient number of life-jackets of a size suitable for children.

Rule F.—In the case of a shipment of this class over 350 feet in length the equipment shall be decided by the Board.

Class III.

Rules for Steamships certified to carry Passengers on Sheltered Bays, and Lakes and Rivers within the Inland Limits, the greatest width of which Lakes, or Rivers does not exceed two miles, or on Short Excursions beyond the Limits of such Sheltered Waters between the 1st May and 30th September, in Fine Weather.

Rule A.—Subject to the provisions of General Rule 20 (1), a ship of this class, of not less than 60 feet in length, shall be provided in accordance with its length with such number of sets of davits of approved form and boats of the minimum aggregate capacity as is specified in the Table in Appendix IV., and they shall be suitably placed to the satisfaction of the Board; each set of davits shall have an approved boat attached to it: Provided that no ship shall be required to have a larger number of sets of davits or greater capacity in boats than is required to accommodate the total number of persons which the ship is certified to carry: Provided also that appliances or arrangements at least as effective for launching boats may be accepted by the Board in lieu of davits.

Rule B.—A ship of this class having a length of less than 60 feet, but in excess of 40 feet, shall carry one approved boat of a cubic content of not less than 50 feet, so stowed that it can be readily placed in the water on either side of the ship. The method of stowage and the means of putting the boat overboard shall be to the satisfaction of the Board.

Rule C.—Subject to the provisions of General Rule 20 (3), such additional boats, or such number of approved liferafts, approved buoyant deck seats, or other approved buoyant apparatus shall be provided as shall be sufficient (together with the boat accommodation required under Rule A or Rule B) to accommodate at least 40 per cent. of the total number of persons for which the vessel is certified.

When in a ship not in excess of 40 feet in length a boat cannot be carried. approved life rafts, or other approved buoyant apparatus shall be provided, sufficient for at least 40 per cent. of the persons for which the ship is certified.

Rule D.—If the ship is under 60 feet in length at least two approved lifebuoys shall be carried: if over 60 feet and under 120 feet in length at least four approved lifebuoys shall be carried; and if over 120 feet in length, at least six approved lifebuoys shall be carried. One approved life-jacket shall be carried for each person on board, and in addition a sufficient number of life-jackets of a size suitable for children.

Class IV.

Rules for Steamships trading or working within the Inland Limits, but not classified to carry passengers, including Tugs, Steam Fishing Vessels, Steam Lighters, Dredgers, Steam Hoppers, Hulks, Tow Barges and such vessels.

Rule A.—A ship of this class having a length of 100 feet or over, and certified to trade or work anywhere within the Inland Limits, shall carry a boat or boats on each side of the ship as shall be sufficient to accommodate all persons on board. The boats shall be attached to davits and one of them may be a boat of Class 3, the remaining boat or boats shall be lifeboats of Class 1.

Rule B.—A ship of this class having a length of less than 100 feet, certified to trade or work anywhere within the Inland Limits shall carry at least one open boat of Class 1 so stowed that it can be readily placed in the water on either side of the ship, and of sufficient capacity to accommodate all persons on board. The method of stowage and means of putting the boat into the water shall be to the satisfaction of the Board.

Rule C.—A ship of this class certified to trade or work only within the limits of certain specified sheltered waters or within certain short specified distances off such sheltered waters shall carry at least one approved boat sufficient to accommodate all persons on board.

Rule D.—A ship of this class if 100 feet or over in length shall carry at least four approved lifebuoys, and if under 100 feet at least two approved lifebuoys. An approved lifejacket shall be carried for each person on board.

Rule E.—When a ship of this class is of such length and carries the lifeboats so placed that undue risk might attend when the crew berthed forward attempted to reach the boats, it shall be in the power of the Board to order that such ship shall carry an approved raft or rafts in addition to the boats required by these rules, so placed as to be readily available for the crew forward, or to order that such other arrangements shall be made as shall be required to meet each particular case.

General Rules.

1. *Definitions.*

In these Rules, unless the context otherwise requires:—

Person includes not only an adult but every child over the age of one year.

Passenger has the same meaning as defined in the Canada Shipping Act, amendment of 1908.

Passenger Steamship means every steamship which carries passengers.

Daylight shall be reckoned as extending from one hour before sunrise to one hour after sunset.

Approved means approved by the Board of Steamship Inspection.

Length, where a ship is referred to, means registered length.

Board means the Board of Steamship Inspection.

Number of persons that a ship is certified to carry means the number of passengers as set out in her certificate with added thereto the number of persons making up her crew.

2. *Power of the Board to accept alternatives.*

The Board shall have power, in general or in any particular case, to accept any boat, raft, buoyant apparatus, or other life-saving appliance, in lieu of a life-saving appliance required by these Rules, subject to such conditions as they may impose, if they are satisfied that under these conditions it will be effective as the appliance required by these Rules: Provided that in the case of a foreign-going passenger steamship no life-saving appliance shall be accepted in lieu of a lifeboat required by these rules except either some other approved type of lifeboat or a life-raft approved as being in every respect as efficient as the pontoon life-raft described in General Rule 10: Provided also that no life-raft shall be accepted on a foreign-going passenger steamship in lieu of a lifeboat required by these Rules unless the total cubic capacity of the lifeboats provided is at least equal to the greater of the two following amounts:

(i) 75 per cent. of the total capacity required to accommodate all the persons carried, or

(ii) The minimum capacity required by Column C of the Table in Appendix I.

3. *Boats.*

For the purpose of these Rules boats are arranged in the following classes:—

Class 1.

A. Open lifeboats with internal buoyancy only.

The buyancy of a wooden boat of this type shall be provided with water-tight air-cases, the total volume of which shall be at least equal to one-tenth of the cubic capacity of the boat.

In the case of a metal boat an addition shall be made to the cubic capacity of the airtight compartments, so as to give it buoyancy equal to that of the wooden boat.

B. Open lifeboats with internal and external buoyancy.

The internal buoyancy of a wooden boat of this type shall be provided by water-tight air-cases, the total volume of which shall be at least equal to seven and a half per cent. of the cubic capacity of the boat.

If the external buoyancy is of cork, its volume, for a wooden boat, shall not be less than thirty-three thousandths of the cubic capacity of the boat; if of any material other than cork, its volume and distribution shall be such that the buoyancy and stability of the boat are not less than that of a similar boat provided with external buoyancy of cork.

In the case of a metal boat an addition shall be made to the cubic capacity of the airtight compartments, so as to give it buoyancy equal to that of the wooden boat.

C. Pontoon lifeboats having a well deck and fixed watertight bulwarks.

The area of the well deck of a boat of this type shall be at least thirty per cent. of the total deck area. The height of the well deck above the water line at all points shall be at least equal to one-half per cent. of the length of the boat, this height rising to one and a half per cent. of the length of the boat at the ends of the well.

The freeboard of a boat of this type shall be such as to provide for a reserve buoyancy of at least thirty-five per cent.

Class 2.

A. Open lifeboats having the upper part of the sides collapsible.

A boat of this type shall be fitted with watertight air-cases and with external buoyancy, the volume of which, for each person which the boat is able to accommodate, shall be at least equal to the following amounts:—

	Cubic feet.
Air cases	1.5
Externel buoyancy (if of cork)	0.2

The minimum freeboard of boats of this type is fixed in relation to their length; it shall be measured vertically to the top of the solid hull at the side amidships from the water level when the boat is loaded.

The freeboard in fresh water shall not be less than the following amounts:

Length of the boat. in feet.	Minimum Freeboard. in inches.
26	8
28	9
30	10

The freeboard of boats of intermediate lengths shall be found by interpolation.

B. Pontoon lifeboats having a well deck and collapsible bulwarks.

All the conditions laid down for boats of Class 1C shall be applied to boats of this type, which differ from those of Class 1C only in regard to the bulwarks.

C. Pontoon lifeboats having a flush deck and collapsible bulwarks.

The minimum freeboard of boats of this type is independent of their length and depends only upon their depth. The depth of the boat shall be measured vertically from the underside of the garboard strake to the top of the deck at the side amidships and the freeboard shall be measured from the top of the deck at the side amidships to the water level when the boat is loaded.

The freeboard in fresh water shall not be less than the following amounts, which are applicable without correction to boats having a mean sheer equal to three per cent. of their length:—

Depth of Boat in inches.	Minimum Freeboard in inches.
12	2¾
18	3¾
24	5⅛
30	6½

For intermediate depths the freeboard shall be obtained by interpolation.

If the sheer is less than the standard sheer defined above, the minimum freeboard shall be obtained by adding to the figures in the table one-seventh of the difference between the standard sheer and the actual mean sheer measured at the stem and stern post; no deduction shall be made from the freeboard on account of the sheer being greater than the standard sheer or on account of the camber of the deck.

Class 3.

Open Boats Which Have Not The Buoyancy Required For Lifeboats of Class 1.

4. *Motor Boats.*

(1) An approved motor boat may be carried as a lifeboat subject to the following conditions:—

(a) It shall comply with the requirements for a lifeboat of Class 1, and proper appliances shall be provided for putting it into the water speedily.

(b) It shall be adequately provided with fuel, and kept so as to be at all times fit and ready for use.

2. Where the number of lifeboats is less than ten, one of them may be a motor boat. Where the number of lifeboats is not less than ten, two of them may be motor boats. The Board may, on application of an owner, allow a greater number of motor boats to be carried, if they are satisfied that the efficiency of the life-saving equipment will not thereby be diminished.

3. In fixing the volume of the internal buoyancy and, where fitted, the external buoyancy, regard shall be had to the difference between the weight of the motor and its accessories and the weight of the additional persons which the boat could accommodate if the motor and its accessories were removed.

5. *Construction of Boats.*

1. All boats shall be properly constructed, and shall be of such form and proportions that they shall have ample stability in a seaway, and sufficient freeboard when loaded with their full complement of persons and equipment. They shall be fitted and arranged to the satisfaction of the Board.

2. The structural strength of the boats shall be to the satisfaction of the Board, and in the case of foreign-going passenger steamships launched on or after the 1st April, 1915, sufficient to permit of

the boats being safely lowered into the water with the full complement of persons and equipment on board.

3. In all open boats, all thwart and side seats shall be fitted as low in the boat as practicable, and shall provide seating accommodation for all persons the boat is deemed fit to carry, and bottom boards shall be fitted so that the thwarts shall not be more than 2 feet 9 inches above them.

4. Internal buoyancy apparatus shall be constructed of copper or yellow metal of not less than 18 ozs. to the superficial foot, or of other durable material, and in open boats of Class 1 may be placed along the sides or at the ends of the boat, but not in the bottom of the boat. For lifeboats to be used in the Inland Trade internal buoyancy apparatus may be galvanized iron of proper weight, but in no other case is this material to be employed. External buoyancy apparatus may be of cork or of any other equally efficient approved material; the use of rushes, cork shavings, loose granulated cork, or any other loose granulated substance, and the use of apparatus dependent upon inflation by air, is prohibited.

5. Open lifeboats of Class 1 shall have a mean sheer at least equal to four per cent. of their length.

6. Pontoon lifeboats may be built of wood or metal. If constructed of wood, they shall have the bottom and deck made of two thicknesses with textile material between; if of metal they shall be divided into watertight compartments with means of access to each compartment and shall be provided with at least two bilge pumps.

7. All pontoon lifeboats shall be fitted with efficient means for quickly clearing the deck of water. The orifices for this purpose shall be such that the water cannot enter the boat through them when they are intermittently submerged. The number and size of the orifices shall be determined by the Board for each type of boat by a special test.

For the purpose of this test:—

(a) The pontoon boat shall be loaded with a weight of iron equal to that of its complement of persons and equipment;

(b) In the case of a boat 28 feet in length, two tons of water shall be cleared from the boat in a time not exceeding the following:—

Class 1C	60 seconds.
Class 2B	60 seconds.
Class 2C	20 seconds.

In the case of a boat having a length greater or less than 28 feet the weight of water to be cleared in the same time shall be, for each type directly proportional to the length of the boat.

8. No boat shall be accepted as a lifeboat the buoyancy of which depends upon the previous adjustment of one of the principal parts of the hull.

9. All boats shall be fitted for the use of a steering oar.

10. All boats shall be permanently marked to the satisfaction of the Board in such a way as to indicate plainly their dimensions and the number of persons for which they are approved. Boats that have been properly marked need not be re-measured, unless there is reason to believe that the marks have been tampered with or are otherwise defective or improper.

TEN MONTHS' CLYDE SHIPBUILDING.

THE Clyde output of new mercantile ships during the first ten months of the current year is nearly 200,000 tons gross less than was launched in the corresponding period of 1913. That represents a rather serious drop, says Syren and Shipping, although the cause of it is not obscure. Even with the conditions normal, the figure for the whole twelve months would probably have shown a decline, because it was fairly obvious during the summer that the activity was slightly declining. The decrease in output is, however, largely due to the war, which, in its earlier days, put almost a complete stop to all industry which was not producing armaments or supplies of one kind and another for the naval and military forces.

Mercantile shipbuilding, like many other industries, is now recovering from the first shock of the conflict as far as its resources of labor will permit, and will shortly, we have no doubt, be making steady progress. In any case it must give a nasty jar to the Huns to find Clyde shipbuilding so unconcerned about them as to be able to show a record of launches for October of 21 vessels, of 45,500 tons gross. That is, as a matter of fact, well above the average, and its significance is that more than one British industry is recovering its composure.

A curious fact of this war is that while its first effect was to close down many industries, there was a return of confidence before any important victory had been obtained anywhere by the Allies. British industries began, as a matter of fact, to recover almost immediately after it became clear that Wilhelm the Butcher and his (alleged) terrible Army were not the miracles they wished us to believe them to be. What will happen in industry when the Teuton is definitely set back in east and west is not easy to say with exactitude, but it is not very rash to hazard the opinion that some trades—shipping, for example—will boom, with highly beneficial results to shipbuilders and marine engineers.

COLLINGWOOD SHIPBUILDING CO. OUTPUT.

THE new vessels built by the Collingwood Shipbuilding Co., during the past year consisted of the bulk freighter, J. H. G. Hagarty, for the St. Lawrence & Chicago Steam Navigation Co., Toronto, and dump scow No. 43, for the C. S. Boone Dredging & Construction Co., Toronto.

The J. H. G. Hagarty dimensions are:—Length 550 ft., beam 38 ft., molded depth 31 ft., and gross tonnage 7,450. Her machinery equipment consists of a set of triple expansion engines with cylinders 24 in., 40 in., and 66 in., in diameter, by 42 in., stroke, operating with steam of 185 lbs. pressure per sq. inch, supplied by 3 Scotch boilers of 13 ft. diameter, and 11 ft. long each, and furnished with forced draft.

Dump scow No. 43 was 130 ft. long, by 30 ft. beam by 11 ft. 3 in. molded depth. She was built of steel throughout on a six pocket plan.

Considerable repair work was as usual carried out, the chief item of which consisted of the reconstruction of the steamer Howard M. Hanna, Jr., a vessel 480 ft. x 54 ft., x 30 ft. This craft, besides being broken in two right down to the tank top was hogged two feet amidships, and her bottom was up throughout her entire length, in some places as much as five feet. The Hanna was brought into dock and straightened out to her normal sheer. A practically new outer and inner bottom was fitted while the side tanks, shell plating and decks were also made good. The vessel belongs to James Playfair, Midland, Ont.

The work on hand consists of a single screw steamer, 180 ft. x 32 ft. x 14 ft. 6 in. for Canadian owners, and a Scotch marine boiler for the Department of Naval Service, for delivery at Halifax, N. S.

Marine Insurance Again Reduced.—The British Government on December 17 announced further reductions in the premiums on marine insurance under the war risks insurance scheme. The rate on a single voyage is reduced from twenty to fifteen shillings, and, on a round voyage of three months, the policy is reduced from forty to thirty shillings.

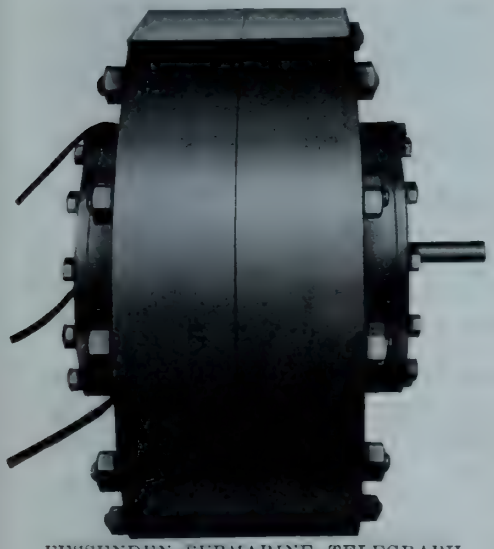
Captain Chas. Bartlett, R.D., R.N.R., the highly esteemed and capable marine superintendent of the White Star Line, and Captain Herbert J. Haddock, C.B., R.D., R.N.R., the commander of the White Star liner Olympic, have been given commissions in the Royal Navy, and each has been placed in command of one of his Majesty's ships.

PROGRESS IN NEW EQUIPMENT

There is Here Provided in Compact Form a Monthly Compendium of Marine Engineering Product Achievements

FESSENDEN SUBMARINE TELEGRAPH OSCILLATOR.

THE device used for intership signaling, etc., is termed an oscillator. It is about 20½ inches in diameter by 15 inches thick, weighs 850 pounds, and is composed of a heavy ring magnet built in two parts, the magnet being energized by an electric coil which produces a very strong magnetic flux. Concentric with the magnet is a central core having a double winding through which an alternating current of 500 alternations per second is run. Lying in the gap between the core and the magnet is a copper tube about eight inches in diameter and about 8 inches long. When the alternating current is turned on, it induces a current in the copper tube, and the copper tube being free to move jumps. When the current in the central core is reversed, the copper tube is jumped back in the opposite direction. This copper tube is attached to a large



FESSENDEN SUBMARINE TELEGRAPH OSCILLATOR.

diaphragm which is in direct contact with the water through which the sound waves are to pass. The oscillations of the copper tube give the diaphragm a vibrating motion of about one hundredth of an inch amplitude at a frequency of 500 per second. The apparatus is used not only for sending and receiving Morse code messages, but is the same apparatus used in getting echoes from icebergs, for taking soundings and for telephonic work as a transmitter and as a receiver.

The oscillator used as a receiving apparatus becomes a very sensitive magnetophone with which signals have been heard up to a distance of 20 miles. So sensitive is this apparatus that when it is mounted with its heavy diaphragm, which is 1 inch thick and 24 inches in diameter, if a person stand in front of the diaphragm and talk, his speech will be transmitted through wires to a telephone receiver. The sensitiveness of the apparatus can be understood when it is realized that under these conditions it is simply the energy of the sound waves of the voice deflecting the 1 inch thick diaphragm. The motion of this diaphragm causes the copper tube to be moved a very small fraction of an inch up and down through the magnetic field, thus acting as a generator and operating the diaphragm of the receiver.

Tests have been made with the oscillator used for submarine telephony. Up to the present time, however, these have only been tried with an ordinary telephone transmitter which will not carry a high current. Using six cells of dry battery, speech has been clearly transmitted to a distance of half a mile and, from the results of tests, there is no doubt that speech can be transmitted a much greater distance if a transmitter is used which will carry a greater current.

EMERGENCY SUBMARINE BELLS.

EMERGENCY submarine bells are of vital importance in cases where accidents occur in fog in which all the machinery on board ship may be put out of commission, rendering the telegraph oscillator and the wireless useless. They are of equal importance for lifeboats after they have left the ship.

In clear weather, wireless may be sufficient, but in thick weather nothing but a submarine signal and a set of submarine signal receiving apparatus will determine the exact position of those signalling for help. Wireless, provided it is not out of commission, can tell of the accident, but it can tell only the approximate position of the disabled vessel. If it be thick, and most accidents occur in fog, the rescuing ship may be within a few miles of the wreck, but be unable to locate her. In the future no such uncertainty need occur.

Each ship and each lifeboat should carry a submarine bell which can be rung by hand. The sound can be heard for miles. Then in fog or darkness the ships equipped for receiving submarine signals can find the ship in distress by the oscillator or the hand bell or her lifeboats by the hand bell just as surely as they now find the submarine bells along the coast.

As an illustration, the third lifeboat of the Columbian drifted in the path of transatlantic liners for fourteen days. Out of 15 men 11 died and the pity of the thing is that it was entirely needless. If the life-boat had carried a submarine emergency bell it could hardly have happened. Three ships were seen to pass and several more may have gone by in the fog. Ever since the Titanic was lost and long before the oscillator was perfected the attention of shipowners

EMERGENCY SUBMARINE BELL.

has been called to the importance of emergency submarine bells for ships and lifeboats.

We are indebted to the Submarine Signal Co., Boston, Mass., for the data and illustrations.

World's Shipbuilding. — During the last fiscal year there were added to the shipping of the world 713 new vessels, with a gross tonnage of 2,020,185, according to the annual report of Lloyd's Register of Shipping. This is said to be the highest total for any one year recorded in the history of the society. About 60 per cent. of the total was for the British Empire. The period covered by the report ended June 30 last.

PROGRESS IN MOTOR SHIP-BUILDING.

IT has been claimed that the oil engine-driven motor ship is not making the rapid headway that was expected, but it is interesting to note, in view of the recent presence of the Danish motor ship Malaka on our Pacific Coast, that during the present year there will be nearly double as many motor ships completed as in the previous year.

In 1912 the motor ship obtained a widespread advertisement largely owing to its novelty. In that year there were exactly twelve large motor ships completed and put into service. In 1913 the number was thirteen, and up to the end of October this year there had been eighteen new vessels of this type finished.

Altogether there have been forty-six ocean-going Diesel ships completed and put into service, and it is said that the amount of capital invested in large motor vessels is now well over $10,000,000. Of the motor ships built this year, seven sail under the Dutch flag, four are Danish, three British, two Swedish and two German.

At the present time there are no fewer than five Diesel ships on the Clyde being made ready for service. The largest of them is the Mississippi. Two others are the Falstria and the Lalandia, which are being built for the East Asiatic Co. of Copenhagen, and destined for the trade between Europe and the North Pacific Coast, via the Panama Canal.

SUSPECTED CRAFT NOTICE.

THE following notice to mariners has been issued by the Dominion Department of Marine:—

"Masters of all vessels navigating in Canadian waters are requested to report the movements of any suspicious craft which they may meet to the Customs officer of the first port at which they touch, for transmission to the captain in charge of the dockyard at Halifax, in the case of the Maritime Provinces, and to the superintendent of the dockyard at Esquimalt in the case of the Pacific Coast.

"It is not desirable that any hearsay information should be given, but it is very important that all definite information secured by masters themselves be promptly forwarded. Notice is hereby given that the western part of Broughton Strait is closed to navigation.

"All vessels, whether northbound or southbound, proceeding from Johnstone Strait to Queen Charlotte Sound, or vice versa, must pass through Weynton Passage and Blackfish Sound.

"Vessels attempting to pass through the channel between Ellen Point and Pulteney Point are liable to be fired upon.

"Vessels are free to call at Alert Bay.

"Mariners are notified that it may become necessary to extinguish all or certain lights on the coasts of British Columbia without further notice. Pulteney Point light and Haddington reefs gas buoy have been extinguished till further notice.

"Masters of vessels within territorial waters on the coasts of British Columbia must obey any instructions by the naval authorities regarding the movements of their vessels."

RANGE LIGHTS FOR FRASER RIVER.

FOR the purpose of facilitating navigation up the lower reaches of the Fraser River, the present lights marking the entrance to that waterway are to be altered so as to give four sets of range lights, by which means a vessel will be more easily navigated to the point known as Woodward's Slough. Mariners are notified by the Marine Department that the installation of these range lights will be undertaken in the immediate future. Other important changes in aids to navigation to be undertaken at once affect the lights at Cape Mudge and Amphitrite Point.

The present light at Cape Mudge will be improved by the substitution of a quick flashing light, while the beacon light at Amphitrite Point will be greatly increased in power. This work will be started as soon as possible in the new year.

A concrete day-mark has also been authorized for Dillon Rock, Shushartie Bay, the work to be undertaken at the beginning of the new year. Three day beacons have been authorized for the Skeena River, and this work is being attended to by the lighthouse tender Leebro.

The lighthouse tender Estevan, Captain Barnes, has been distributing supplies and attending to buoys and beacons in Northern B.C. waters, and the Quadra, Captain Le Blanc, has been circling Vancouver Island on a similar mission.

All three tenders are expected to be back in Victoria for the Christmas holidays.

POLSON IRONWORKS, LTD., OUTPUT.

AS will be observed from a study of the accompanying table showing vessels built complete and building by the Polson Ironworks, Ltd., Toronto, considerable activity has been in evidence throughout the year at the shipbuilding plant of this old-established concern. In addition, of course, to the new work indicated, a more than ordinary amount of general marine repairs and vessel overhauls were also undertaken.

Capt. Frank Scott died at Collingwood, Ont., on Dec. 17, aged 44. Deceased had been identified with the marine interests there for some years.

POLSON IRONWORKS, LIMITED, TORONTO, ONTARIO.

Description and Owner.	Length	Breadth	Depth	Tonnage		
Canadian Pacific Railway Co.—						
Car barge	224′ 0″	42′ 6″	8′ 0″	681.12	Launched Jan. 20, 1914.	In Commission.
Quebec Harbor Commission—						
500-yard dump scow	145′ 0″	31′ 0″	11′ 0″	434.28	Launched Mar. 4, 1914.	In Commission.
500-yard dump scow	145′ 0″	31′ 0″	11′ 0″	434.28	Launched Mar. 17, 1914.	In Commission.
500-yard dump scow	145′ 0″	31′ 0″	11′ 0″	434.28	Launched Apr. 21, 1914.	In Commission.
300-yard dump scow	108′ 0″	28′ 0″	9′ 0″	241.23	Launched Apr. 1, 1914.	In Commission.
300-yard dump scow	108′ 0″	28′ 0″	9′ 0″	241.23	Launched Apr. 7, 1914.	In Commission.
300-yard dump scow	108′ 0″	28′ 0″	9′ 0″	241.23	Launched Apr. 14, 1914.	In Commission.
Department Railways and Canals—						
Lighter No. 1	128′ 0″	21′ 6″	10′ 0″	267.80	Launched May 30, 1914.	In Commission.
Lighter No. 2	128′ 0″	21′ 6″	10′ 0″	267.80	Launched May 30, 1914.	In Commission.
Lighter No. 3	128′ 0″	21′ 6″	10′ 0″	267.80	Launched July 27, 1914.	In Commission.
Canadian Stewart Co.—						
Dredge "Cyclone"	170′ 0fi	42′ 0″	12′ 0″	1206.54	Launched July 11, 1914.	In Commission.
Dredge "Tornado"	170′ 0fi	42′ 0″	12′ 0″	1206.54	Launched Aug. 15, 1914.	In Commission.
Derrick scow	120′ 0″	42′ 0″	9′ 0″	411.31	Launched July 21, 1914.	In Commission.
Department Marine and Fisheries—						
Buoy boat "Grenville"	164′ 6″	30′ 0″	13′ 0″	625.00	Launched Nov. 7, 1914.	Finishing.
Ontario Car Ferry Co.—						
Car Ferry "Ontario No. 2"	318′ 0″	54′ 0″	20′ 0″	5200.00	Building. On stocks.	Launch in February.
Mrs. T. Eaton—						
Yacht	94′ 0″	12′ 0″	5′ 0″	51.00	Building. On stocks.	
Total tonnage				12217.44		

LACHINE CANAL TRAFFIC.

WHILE fewer vessels made fewer trips through the Lachine Canal during the past season than during 1913, the increased tonnage of these vessels was such that 59,118 tons of cargo were carried more than during the previous season. The season of 1914 has been the record one in the history of the port of Montreal for the carrying of cargo, the great increase having been made in grain.

Only 615 vessels with a total combined tonnage of 229,255, as against 664 with a combined tonnage of 239,377 in 1913, went through the canal, and they made 9,049 trips, or 1,148 less than last year. In making those 9,049 trips, the total tonnage operated during the season just at an end was 4,989,972, an increase of 12,413 over 1913. The total number of tons of grain and miscellaneous cargo carried was 4,230,210, an increase of 59,118 tons over 1913. Passengers carried during the season through the canal and down the Rapids were 90,980, being less than 1913 by 16,084.

While there was a decrease in the number of steamers during the year as compared with the previous year, there was an increase in the number of Canadian steamers from 175 with 105,173 tons burthen in 1913 to 190 with 125,168 tons in 1914. The American steamers decreased from 35 to 27; the Canadian barges and scows from 271 to 255; the American barges and scows from 11 to 9, and the American canal boats from 176 to 134 in 1914 so that the only increase was in Canadian steamers.

Most Cargo Tonnage Down.

For this year, the number of Let Passes issued were 5,764, a decrease of 87 from 1913; the number of Let master's tickets up, 1,334, a decrease of 425; the Lock master's tickets down, 3,014, a decrease of 115, and the permits to pleasure craft, 312, an increase of 86. The Let Passes to tugs to operate in all Dominion canals was 32, being three less than last year.

One hundred and seven rafts with 5,000 lineal feet of lumber each, totalling 535,000 feet in all or 1,070 tons, went through the canal. There were also 15 rafts of square timber comprising 354,722 cubic feet.

An interesting light on the amount of cargo that goes westward to that which comes down into the port of Montreal is shown by the following comparison of the up and down figures:

Number of trips up, 4,544; down, 4,505; tonnage of vessels operated—up, 2,469,404; down, 2,520,568; cargo tonnage, up, 959,253; down, 3,270,958; passengers carried up, 27,576; down, 63,413. The grain and other products for export make the huge total of cargo down as compared with the small amount of package and other freight going up. The fact that over double the number of passengers are carried down to those carried up is accounted for by the popularity of the Rapids' trips and the great number of Americans who take in the St. Lawrence attractions one way in their summer vacations.

Great Grain Increase.

The grain carried into Montreal throu

The grain carried into Montreal through the canal amounted to 67,343,952 tons, an increase of 14,505,256 bushels over 1913. The great increase is in wheat, 49,889,243 bushels having come down or 18,348,550 bushels more than in 1913. Oats also increased 1,321,711 bushels over the 1913 amount brought down, 12,189,577 bushels having come down this year. Barley only exceeded 1913 by 622,249 bushels, the amount this year being 4,214,483 bushels. Rye was little more than last year, 273,222 bushels being brought down, as against 270,249 bushels the previous year. The great decrease was in flaxseed, which dropped away almost to nothing, the record of 1913, when 6,348,936 tons moved down, being replaced this year by 667,494 tons. The only other decrease was in corn, 109,933 bushels having come this year as compared with 182,718 bushels last year. There were no peas or buckwheat. The total increase this year over 1913 does not come up to the increase of 17,037,757 bushels of 1913 over 1912.

Coal.

There was a decrease of 232,044 tons in the amount of coal brought to Montreal and into the canal basin this year. Last year 835,242 tons came to the harbor and this year only 604,758 tons. In 1913 the number of tons of coal delivered in the canal basin both from up and down the river amounted to 530,190 tons, as compared with 528,630 tons this year. In this amount is included the 95,078 tons of soft coal brought from the harbor up into the canal. Last year the amount so brought up was 105,341 tons.

Pulpwood.

The pulpwood up the canal to Canadian ports, 22,740 tons, decreased by 1,702 tons, while that to American ports going up through the canal was 119,651 tons, an increase of 17,155 tons. In pulp the same tendency is more noticeable. The sixteen hundred tons sent up to Canadian ports was 1,131 tons less than in 1913, while the 36,012 tons sent to American ports was 25,643 tons in excess of the previous year, or nearly three and a half times as much. The net increase in pulpwood through the canal was 15,453 tons and of pulp 24,512 tons.

Flour Increases.

Flour shows an increase of 626,959 sacks over 1913, this year's amount being 1,091,990 sacks or 76,440 tons, as against 32,553 tons last year. The Dominion Government's war gift has had a great influence in this increase. Other statistics compared with 1913 of food products are as follows: 14,908 cases of eggs this year, 2,310 cases less; 6,544 packages of butter, 924 less; 184,694 boxes of cheese, 13,604 less, and 30,448 barrels of apples, 14,221 less.

The trips made in ballast this year for return cargoes are as follows: Steam vessels, 1,739 in 1914 and 1,160 in 1913, an increase of 579; sailing vessels, 1,679 in 1914 and 2,246 in 1913, a decrease of 567. The number of trips this year on which cargo was carried number 5,631, as against 6,791 trips last year.

Lumber.

There was a large falling off in the amount of lumber which comes down from Ottawa for United States ports by American canal boats. There were 14,368 tons, or 8,620,800 feet board measure this year, as against 23,311 tons, or 13,386,600 feet in 1913.

The dearth of building in Montreal and other St. Lawrence River cities is reflected in the decrease of 15,775 tons of sand which went up the canal and the decrease of 33,755 tons in the sand which came down, a total decrease of 49,530 tons. Going up this year there went 65,713 tons and down 68,644 tons.

Season's Records.

The records for the season are as follows: Largest wheat cargo, 92,136 bushels, or 2,765 tons, by Steamer Calgary, of 1,305 tons burthen, from Port Colborne on October 4; largest cargo in number of bushels, 135,000 of oats or 2,295 tons, by Steamer A. E. McKinstry, of 1,023 tons burthen on May 7, from Fort William; first grain vessel arriving, Arabian, of 770 tons, on April 29, from Buffalo, with 64,941 bushels of oats; largest cargo tonnage to a western point, 464,785 tons of pulpwood or 70,871 more than the largest in 1913; largest cargo tonnage eastbound of any commodity, 67,343,952 bushels grain, or 1,834,469 tons, coal being next with 1,133,388 tons; largest coal cargo, 2,750 tons, by Calgary, on June 20; steamer with largest tonnage, Fordonian of 1,905 tons; barge with largest tonnage, Ungava, of 1,226 tons; greatest increase in grain, 18,348,550 bushels of wheat; greatest decrease in grain, 5,717,442 bushels flaxseed.

The canal office has been open night and day, Sundays and holidays included, during the whole season.

Empress of India Sold.—It is reported from London that the C. P. R. liner Empress of India has been sold to the Gwalior of Baroda, as a hospital ship for the Indian troops.

The Rule of the Road Practically Explained-III.

By Captain Wheeler, Ex. M., F.L.T.

This series of articles, for the publication of which we are indebted to the Motor Ship and Motor Boat, will serve to clear up many misconceptions that exist concerning the regulations which have been formulated to secure immunity from collision by vessels of all kinds and in all waters.

FOG SIGNALS.

FOG is one of the worst enemies to be met at sea, and while many improvements have been made in recent years to minimize its attendant risks, in the matter of submarine signals, there is still plenty of room for further improvements which should not only be effective, but also well within reach of all, and particularly motor yachtsmen. Apparatus which is costly to buy and intricate to work is of no use, and, pending some appliance which will eliminate the uncertainty of one's position in a fog, the present use of steam whistles and for-horns will have to be continued. Sound is very erratic at sea.

The fog signals given by vessels are such as to indicate their class, and so assist other approaching vessels to ascertain what action must be taken. Every vessel must be provided with a bell (except Turkish vessels, which substitute a drum), and the rules require that, when at anchor in fog, this bell must be rung rapidly every minute for five seconds.

Every vessel shall also be provided with an efficient foghorn sounded by mechanical means, and sailing vessels and vessels towed must use this when in fog. A steam vessel must also be provided with an efficient whistle or siren sounded by steam or some substitute for steam, and so placed that the sound is not intercepted by any obstruction. The position of the whistle is just as important as the placing of an anchor light, and when placed in the fore part of the funnel the sound may often be deflected considerably. Make sure you have chosen a good position, then you will be more sure of it being heard.

Blasts are called short or prolonged, and these are of one second and from four to six seconds' duration respectively. Not only in fog, but also in heavy rain, mist, or snow storms, must the signals be given, at any time, day or night. A steam vessel when moving through the water sounds a prolonged blast every two minutes or less. When she is under way, i.e., not at anchor or made fast to the ground, but stopped, she sounds at similar intervals two prolonged blasts, with an interval of one second between them.

Sailing vessels when under way use their foghorn at intervals not exceeding one minute, and give one blast when on the starboard tack, two blasts when on the port tack, and three blasts with the wind abaft the beam. In following the rule of the road at sea, sailing vessels are supposed to be on a tack when lying six points from the wind, and thus allow the direction they are heading to be readily calculated; but in this article dealing with fog signals, such an allowance of six points would not be correct, as then we should find that a vessel having the wind anywhere between six points from ahead and forward of her beam would not have a fog signal allocated to her; consequently, they are assumed to be on a tack in this case when the wind is anywhere forward of the beam.

Any vessel which is engaged in work on a telegraph cable, or being towed, or by accident or other cause prevented from getting out of the way of an approaching vessel shall give a prolonged blast, followed by two short blasts, at intervals not exceeding two minutes. Sailing vessels of less than 20 tons gross need not give these signals, but they shall make some efficient signal at least every minute.

Fishing vessels as drifters, trawlers, dredgers, and line fishing craft, if over 20 tons gross ,must, when engaged in fishing, give a prolonged blast on the whistle or foghorn, according to whether they are driven by steam or sail, the blast to be immediately followed by ringing the bell. Any vessel which has the misfortune to run aground, or, in the case of a fishing vessel, gets her gear fast to a rock or other obstruction, shall be considered at anchor, and make the signal necessary for such case.

Two Vessels Approaching.

At this point it should be noticed that confusion often arises on two vessels approaching each other. In the latter part of this article are given the signals which should pass between two steam vessels approaching each other and in sight of one another. In the reports given by the captains of the Empress of Ireland and the Storstad after the collision, the captain of the Empress of Ireland states that he first gave a long blast, as required during fog, later on two long blasts to denote he had stopped the way on his ship, then later he gave three short blasts. The latter signal denotes "under conditions when two vessels are in sight of one another" that the engines of the vessel giving them are going astern.

The evidence states that the Storstad loomed up out of the fog at a distance of 800 ft. away, so that as fog existed at the time of collision and the vessels were not then, or a minute or two earlier, in sight of each other, the Empress of Ireland had no right to sound three short blasts. Though the short blasts did not contribute to the accident, it shows how carefully these rules should be considered.

The rules also require that during fog, mist, falling snow or heavy rain, every vessel shall go at a moderate speed, having due regard to the existing circumstances and conditions. The speed required is "moderate," but such a requirement is exceedingly vague. Take a tramp steamer which at her best can only plug along at seven or eight knots; she should reduce speed to, say, four knots. A large passenger vessel with a speed usually about 20 knots also reduces speed, but some vessels, owing to their dimensions, are unable to steer by the aid of the rudder alone unless proceeding at about seven or eight knots. In the case of the latter, the master might be exonerated should an accident occur, "as he had reduced speed," but the master of the tramp steamer would be severely hauled over the coals if his vessel continued at eight knots. The only case where distinct action is given happens when a steam vessel hears the signal of another somewhere forward of her beam, the position of which is not ascertained; she has then, so far as the circumstances of the case admit, to stop her engines and navigate with caution until all risk of collision is over.

Ottawa, Ont.—Tenders will be received up to Friday, January 8, 1915, for the undermentioned metal and miscellaneous supplies for delivery to H. M. C. Dockyards at Halifax, N.S., and Esquimalt, B.C. Metals.—Steel angles, bars, sheets and plates; iron bars; babbit metal, tin, antimony and aluminum; brass bars, sheets and tubes; lead sheet; solder and spelter; zinc plates; wire rope. Miscellaneous:—paints, dry and mixed; white lead, red lead, zinc oxide, iron oxide, marine dryers, enamel, varnish, putty, cleansing powder; soap, hard, soft and castile; tallow, brooms and brushes, polishing paste, squeegees, rubber sheet packing, etc.; cotton waste. Forms of tender and full information may be obtained by application to the undersigned or to the Naval Store Officers at H. M. C. Dockyard at Halifax, N.S., and Esquimalt, B.C. In making application for forms the particular item or items for which forms are required should be clearly stated. G. J. Desbarats, Deputy Minister of the Naval Service.

READERS' NOTES AND VIEWPOINT

Devoted to Brief Article Contributions Covering Experiences, Correspondence and Comment on Matters Marine. We Pay for Suitable Material.

COMMUTATOR AND OTHER TROUBLES—II.

By H. C. Thomas.

PART I. of this article appeared in our November issue, and discussed the steps to be taken relative to sparking, bedding and spacing of brushes, also the removal of projecting mica. Further common troubles and their remedies are dealt with in the present instance.

When the commutator has become so worn that it is considered advisable to true it up in a lathe, it should preferably be held by two steadies placed at the points where the shaft usually rotates in its bearings. These steadies will help to prevent vibration. The writer has known cases where, in overhauling small motors, the commutator was turned up and the old centres were undamaged, but owing to a slight spring in the shaft, when the armature was replaced in its bearings the commutator was slightly out of truth. This could not have happened if the commutator had been turned up with the shaft running in two steadies at the points where it usually ran in its bearings.

When turning commutators, use a sharp pointed tool, take light cuts, and avoid the use of a file if you can get the desired finish with the tool. Polish afterwards with sandpaper, two or three thicknesses of it in a concave block being best. If any small pieces of copper have dragged over from one segment to the next, remove them carefully.

The commutators of large armatures which can be revolved slowly by an engine or separate motor are best trued up in their bearings, using a turning tool or an emery wheel attached to a portable slide rest. A special commutator grinding machine may be used, rotating the armature by its own engine, and the grinding machine taking its power by belt from the generator shaft. This method is perhaps the most satisfactory, where the expense of purchasing a grinding machine is justified.

Before commencing to true up a large commutator, the bolts of the end plate should be tried to see that they are tight. Care must, however, be exercised in tightening up the bolts under normal working conditions, as the commutator may be thrown out of truth; in fact, the commutator must at all times be treated with care, because owing to the nature of its construction it is easily damaged. It must never be allowed to support the weight of the armature when being removed from the machine, nor must ropes be passed around it when being raised by blocks or crane; the weight should be supported by the shaft.

Commutator Lubrication.

Regarding the use of a lubricant on the surface of a commutator, there is a divergence of opinion, and much depends on the conditions and the amount of attention which the machine usually receives. It will generally be found that the occasional application of fine sandpaper, followed by a clean cloth slightly moistened with good machinery oil, tends to keep the commutator in good order. Excess of oil and lack of cleaning may result in the accumulation of carbon dust and oil on the windings; this mixture being of course a conductor, will tend to cause a breakdown. The use of emery cloth on the commutator or anywhere else on the machine is not advisable.

Air Gap Adjustment.

The correct adjustment of the air gap is a matter which calls for occasional attention, due to wear of the bearings or, what may happen in some bipolar machines, movement of the pole pieces, although this rarely occurs. A hardwood wedge 8 ins. long by ½ ins. wide and tapering from ⅜ in. to a fine edge is a useful little tool for checking this. When inserted between a pole piece and the armature, the amount by which it projects from the former provides ready means of ascertaining whether the shaft has worn down in the bearings and needs re-alignment. This checking should be made at about the middle of the pole-piece. In this connection it should be noted that any downward movement of the armature and consequent lessening of the air gap underneath it tends to throw a considerable extra strain upon the bearings due to the unbalanced magnetic pull, hence the importance of watching for any reduction in the bottom air gap. Some cases of sparking have been cured by increasing the air gap all around, that is, boring out the pole pieces, but it must be remembered that this is done at the expense of efficiency, which falls off rapidly as the air gap is increased.

Hot Bearing Trouble.

A case of persistent hot bearing in a six-pole generator was traced to the fact that the yoke was not in the correct position with reference to the armature, causing considerable end thrust at the enlarged portion of the shaft where it pressed against the bearing. To eliminate the trouble, the yoke was moved in the direction of the axis of the shaft, new bolts being used to keep it in its new position.

Insulation Resistance.

The gradual reduction in the insulation resistance of a machine, which often takes place before an actual breakdown of the insulation occurs, may be detected by the use of an ohmmeter and generator. Where there are a number of motors operating in a plant, particularly where the conditions are severe, the man in charge of them should take periodical readings, say once a month, and each set of results compared with those previously obtained. In this way the condition of the machines may be kept under constant observation, and the chances of a sudden breakdown reduced to a minimum. These readings should be taken as nearly as possible under the same conditions—e.g., after a day's run, because the readings will not be the same when the machine is hot as when it is cold.

Chatham, Ont.—The City Council has decided to petition the Dominion Government to arrange for an ice-breaker to lay up at the mouth of the Thames during winter months and break the ice in the spring to reduce the damage done by spring freshets. The damage is usually caused by ice jams.

Victoria, B.C.—As indicative of the gigantic nature of the breakwater contract now well in hand by the firm of Sir John Jackson, Ltd., it is interesting to learn that, since the contract was started and up to the end of November, a grand total of 710,895 tons of rubble had been dumped at the side of the breakwater off Ogden Point. This total includes: 471,196 tons of course rip-rap and 239.699 tons of the core or quarry run. Figures compiled by the supervising engineer show that throughout the month of November, a total of 31,611 tons of rubble, and 6.088 tons of quarry run, was dumped, which is a most satisfactory showing in view of the fact that November is considered to be one of the stormiest months of the winter. The grand total of granite blocks laid up to the end of last month is placed at 15,238 tons, and during November 2,298 tons of granite block were laid in position under the supervision of divers.

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Vol. IV DECEMBER, 1914 No. 12

PRINCIPAL CONTENTS.

CANADIAN SHIPBUILDING IN 1914.

ALTHOUGH returns from all shipbuilding and ship-repairing centres of the Dominion are not yet to hand, there is ample evidence that, despite the widespread business depression preceding and consequent on the European War, the output of new and repair work compares quite favorably with former years. The immediate future outlook cannot, however, be considered as encouraging as it was a year ago, although with a speedy termination of the conflict of nations, activity relative to the shipbuilding industry would, we are inclined to believe, readily and quickly develop. There is hardly any doubt but that the conclusion of the war will witness an enlargement of the shipbuilding scope independent altogether of any relation it may have to other enterprise possibilities arising from the crushing out of German commercial influence.

"RING OUT THE OLD—RING IN THE NEW."

INTO the lives of none of us, however long or short may have been our sojourn in this Old World, has there at any time been thrust an experience so far-reaching in its effects as that to which we are now subjected. All of us, we dare say, have figuratively speaking, been more or less under fire in the individual or personal sense, and have emerged, scarred it may be from the ordeal. The experience to-day is both collective and individual and altogether universal in its scope. The craft to which we belong and its handiwork are giving evidence of themselves in a manner which while betokening high-degree skill and accomplishment, yet appears to smack strongly of misdirection, in that the bent is destructionwards.

There need be no ground for alarm or uneasiness however on the latter score. The destruction which the naval architect and the engineering fraternity have made possible to-day is preliminary to a redirection of effort and advance to-morrow, and although our civilization has been arrested or has even been given somewhat of a setback, the rebound, when right has again been enthroned and might, the ogre of selfishness, has been swept to the four winds, will be that much more powerful, and its potentialities more pregnant and prolific. The spirit shown in these trying days is such as will contribute to make 1915 from its dawn onwards the harbinger and bearer of greater opportunity and enlarged appropriation and, needless to say, as in the past, we are ready through the medium of our publication to measure up to every requirement.

In this issue the first section of the Canadian Government Regulations concerning vessel equipment with life-saving appliances appears and will be continued to completion of the whole in our January and February, 1915 numbers. Being the off season, shipping interests in every department have therefore good opportunity to study and digest the various provisions which have been officially adopted, and to measure up the resultant general effects. It will be generally agreed, however, that the new regulations are in the direction of forward progress, and while exception may be taken by some concerning possibly unnecessary requirements being insisted upon, there is manifest wisdom in being on the side of safety. The mariner's vocation keeps him perhaps more close to the verge of disaster than do a great majority of the callings pursued by landsmen, hence its being more incumbent that everything should be done for his safety and that of those committed to his care, as well as of his ship, that up-to-date experience can devise.

It is now in order, and at the same time our privilege to express to the many friends of Marine Engineering of Canada, known and unknown, our hearty and sincere good wishes for a growingly bright and prosperous New Year.

Man is not born to solve the problems of the universe, but to find out what he has to do and to restrain himself within the limits of his comprehension.—Goethe.

Marine News From Every Source

Montreal, Que.—Navigation for the season on the St. Lawrence is now closed. The Manchester Spinner was the last ship to leave for a Birtish port.

Port Stanley, Ont.—The town council has appointed a committee to inquire into the necessity of enlarging the harbor and advisability of erecting a swing bridge in place of the present bridge.

Kingston, Ont.—Tenders are being called for the erection of 1,600 feet of concrete breakwater on King Street West. The work is to be done during the winter months and only city labor is to be employed.

North Vancouver, B.C.—Plans for the second unit of the plant which is to be erected here at a cost of $5,000,000 by the Dominion Shipbuilding and Drydock Co., Ltd., have been sent to Ottawa for approval.

Halifax, N.S.—Plans are being prepared by the Department of Public Works for a dry dock which is to be built here at a cost of $3,000,000. The dimensions of the dock will be 1,150 ft. long by 180 ft. wide.

Owen Sound, Ont.—American capital is being interested in the Owen Sound dry dock proposition. The new plant is to be capitalized at $1,500,000 and the plans have been approved by the Public Works Department at Ottawa.

Montreal, Que.—January 11 is the date fixed for the trial of the $3,000,000 damage action taken by the C. P. R. against the Norwegian owners of the collier Storstad, which rammed and sank the Empress of Ireland. The case will be heard by Mr. Justice Dunlop, sitting in Admiralty Court.

Kingston, Ont.—The biggest fleet ever laid up in Kingston by the Montreal Transportation Co. is now in winter quarters. Every vessel, with the exception of the steamer Stormount, which has been quartered at Midland, is laid up at this port. The fleet includes ten steamers, seven tugs and thirty barges.

Victoria, B.C. — Announcement was made by D. O. Lewis, divisional engineer of the N.P.R., that work is to be commenced immediately on the construction of the wharf at Patricia Bay. The contractor, J. Doe, is already assembling a plant, and by the terms of the contract the job must be finished by January 1. The wharf will be a very substantial structure. Much of the piling is already in position.

Ottawa, Ont.—A letter has been received by the Government from the Imperial Russian Government expressing gratitude for the sale by Canada of the icebreaker, Earl Grey. The boat has been rechristened the Canada, and will be used to keep the port of Archangel open. The icebreaker Stanley will replace the Earl Grey in the Northumberland Straits.

Welland Canal Work.—Expenditures totalling $6,000,000 have been made on the Welland Canal work this season, and the four contracts under way are one-quarter completed. Four sections are yet to be contracted for, but they are so located that it is not urgent that they be let until the work on the existing contracts is further advanced. It is estimated that the canal work will be completed in two years.

Halifax, N.S.—The Dominion Government is making special arrangements for handling the increased traffic which will pass this winter through the ports of Halifax and St. John. The big terminal and dock improvements under construction at Halifax in connection with the Intercolonial will play a part in this work as far as they are completed and for the rest temporary arrangements will be made. At St. John a new dock has been completed, and the tug Lord Strathcona has been leased from the Quebec Wrecking & Salvage Company for work in the harbor.

Ottawa, Ont.—The Montreal, Ottawa and Georgian Bay Canal Co. will apply to Parliament next session for an extension of time for the construction of the canal. The Montreal, Ottawa and Georgian Bay Canal Co. is the private concern which still holds an old charter to build the proposed waterway. Meanwhile, the Government is going ahead with its own enquiry into the commercial feasibility of the project, through the commission of which Mr. Sanford Evans is the head. Mr. Evans recently returned from New York, and was in Ottawa for a time.

Mercantile Cruiser Fleet Flagship.—The steamship Alsatian, of the Allan Line, newly fitted and armed with eight six-inch guns and a number of quick-firers, has been chosen as the flagship of the Mercantile Cruiser Squadron, under command of Admiral De Chair, according to a recent despatch. Officials of the Allan Line, questioned about the matter, say that she was probably chosen because of her speed of 21 knots an hour, and her seaworthiness. The sister ships, Alsatian and Calgarian, of the Allan Line, are the first transatlantic liners built with the cruiser stern. That the Government should choose the Alsatian as flagship is considered a great compliment to the Allan Line as well as to the vessel herself.

Navy Titles for Officers.—In response to certain suggestions made by the Imperial Merchant Service Guild, Mr. Moore, the secretary of that body, has received a communication from Admiral Savory, R.N., director of transports, to the effect that the Lords Commissioners of the Admiralty have, after full consideration, decided that in case of all officers holding masters' certificates who are engaged on vessels taken over by the Admiralty and commissioned for service with the fleet they will be granted temporary commissions as sub-lieutenants, R.N.R., and in the case of the second engineers in such vessels they will be given temporary commissions as assistant engineers, R.N.R.

Pilotage Regulations.—Now that winter navigation has set in, new pilotage regulations have been put into effect for the Port of Sydney. As a result, steamships employed in trading between any one or more of the provinces of Quebec, New Brunswick, Nova Scotia or Prince Edward Island, and any other or others of them, or employed in voyages between any port or ports in the said provinces, or any of them, and the Port of New York or any port of the United States of America on the Atlantic, north of New York, will not hereafter be either wholly or partially exempted from the compulsory payment of pilotage dues, except steamships registered in Canada of not more than one

hundred and twenty registered tonnage, which shall be exempted from the compulsory payment of pilotage dues.

Ottawa, Ont.—The Collingwood Shipbuilding Co. was on Dec. 9 awarded the contract for a new dredge for the Marine Department. It will cost $134,000.

Presentation to J. G. Sing.—The members of the engineering staff of the Toronto district office of the Public Works Department of Canada have presented an antique clock to Mr. Sing who is retiring after twenty years' service there.

New Lightship Next Year.—The lightship guarding Corsica Shoal, south Lake Huron, has been removed and is now at Port Huron. The ship will be taken to Detroit this winter, and next spring will be replaced by a new steel one, which at the present time is being fitted out at Detroit.

Fleet Additions.—At the opening of the new docks at West St. John on December 10, G. M. Bosworth, vice-president of the C.P.R., told of the purchase of two new steamers by his Company and the charter of three others each by the C.P.R. and the Allan Line. He promised enough business to keep the port busy during the winter.

St. John, N.B.—The Hon. J. D. Hazen, Minister of Marine, Hon. Robert Rogers, Minister of Public Works, and G. M. Bosworth, vice-president of the C.P.R., spoke at the opening of the new steamship dock at West St. John, on Dec. 10. The opening of the dock was performed by Miss Frances Hazen, daughter of the Minister of Marine.

P. B. Mignault, K.C., of Montreal, has been appointed a member of the Canadian Section of the International Waterways Commission, filling the vacancy caused by the retirement of Hon. T. Chase Casgrain on his appointment as postmaster general. Mr. Mignault is an authority on international law, and a member of the law faculty of McGill University.

Clyde Shipbuilding.—Although nothing had leaked out, the shipbuilders on the lower reaches of the Clyde have recently been very fortunate in securing new work to fill up the fast-decreasing order books. Certainly they could each do with a great many more contracts, but these will come along all right in the near future, as foreign business begins to open out, and the war situation becomes clearer.

Seamen Get Increase.—The British Board of Trade has decided to award the Liverpool seamen an increase in wages of ten shillings ($2.50) per month. The question of raising the wages of the seamen was submitted to the Board of Trade for arbitration shortly after the war broke out. The men requested an advance of $5 per month over their old wages to cover the extra risks of navigation.

Ottawa, Ont.—Navigation, both on the Great Lakes and on the St. Lawrence, is now almost entirely closed. Every lighthouse keeper on the Great Lakes, except the keeper on the Parisian Island lighthouse, not far from Sault Ste. Marie, has been taken off, this somewhat difficult and sometimes dangerous work being accomplished without mishap. None of the keepers will stay with their lights this winter, as has sometimes been done for motives of economy.

Record Naval Construction.—What is described by the Admiralty as a record in ship construction was announced in London on December 17. The light cruiser Caroline was delivered complete on that day, and placed in commission ten and one-half months after her keel was laid. The date of delivery specified in the contract was May 31, 1915. Cammell, Laird & Co. of Birkenhead built the cruiser, which is of 3,800 tons displacement, and has a speed of 30 knots.

Marine Insurance Lower.—The Board of Trade, London, England, announces that the Government rate for the insurance of cargo against war risks is reduced from two guineas to one and one-half guineas per cent. as from December 11. This is a direct result of the defeat of the German squadron in the South Atlantic. For three months there has been no change. When the State Insurance Office opened its door August 5, the rate quoted was five guineas. On August 8 the rate was reduced to four and on August 18 to three guineas. On September 1 it was lowered to two guineas. The underwriters had anticipated this reduction. Unlike the Government office they are able to discriminate between different routes, but the only trade in which their rates are substantially lower than the Government's new quotation is that of the North Atlantic. Cargo to and from North America has been freely written at 7s. 6d. per cent.

PANAMA CANAL TRAFFIC.

DURING the first three months of its commercial operation, from August 15 to November 15, the cargo transported through the Panama Canal amounted to 1,079,521 tons. The total charge on loaded vessels of $1.20 per net ton has been found in this period to be equivalent to a charge of approximately 75c on each ton of cargo, and the revenue of the Panama railway from each ton of through freight carried across the isthmus during the fiscal years 1913 and 1914 was $3.06. Over 95 per cent. of the traffic may be grouped under four heads:

(1)—The United States coastwise trade.

(2)—The traffic between the Pacific coast of the United States and Europe.

(3)—The trade of the west coast of South America with the Atlantic seaboard of the United States and with Europe.

(4)—Traffic from the Atlantic coast of the United States with the Far East.

The coastwise trade (1) has employed 95 vessels, transporting 506,357 tons of cargo, and this amounts to 46.9 per cent. of the total cargo carried.

Traffic to Europe from the west coast of the United States (2) has amounted to 201,848 tons; and traffic to the west coast of South America from the United States (3) has consisted of one vessel with 610 tons of coal from Norfolk to Valparaiso and seven vessels with 40,746 tons of general manufactures from New York for distribution between Callao and Valparaiso. The trade from the Atlantic seaboard of the United States through the canal to the Far East (4) has been as follows:

To Japan, three vessels with 17,570 tons of refined petroleum and petroleum products, and seven vessels with 25,258 tons of general cargo and 14,817 tons of raw cotton.

To China, four vessels with 24,730 tons of refined petroleum.

To Australia and New Zealand, three vessels with 22,498 tons of general merchandise and two vessels with 12,701 tons of refined petroleum.

The total export to the Far East through the canal has amounted to 117,574 tons. None of the vessels carrying this cargo have returned to the canal, and no cargo has been shipped through direct from the Far East to the United States or to Europe. The following table may be taken as a summary of the traffic over the several routes:

	Vessels.	Tons of Cargo.
Coastwise, eastbound	45	265,388
Do., westbound	50	240,969
United States Pacific coast to Europe	27	201,848
Europe to United States Pacific coast	4	21,102
South America to United States and Europe	12	150,444
United States and Europe to South America	13	63,638
United States Atlantic coast to Far East	19	117,574
Miscellaneous traffic	5	18,558
Vessels without cargo	27	.....
Total	212	1,079,521

PANAMA CANAL NOTICE.

ARTICLES XIII. and XIV. of the Rules for the Measurement of Vessels for the Panama Canal set forth what space may be used for carrying coal and other fuel for a vessel's own use without payment of tolls for the space so occupied.

The rules are liberal in making ample provision for such space and authorize the owner of the vessel to select either

of the two provisions that he may elect as set forth in the rules. Full tolls are levied on loaded vessels and reduced tolls on those in ballast and, in order that there may be no misunderstanding, vessels will be considered in ballast only when they carry no passengers and do not carry either coal or merchandise of any description in any quantity whatsoever except bunker coal or other fuel for their own use. In order that they may be entitled to claim the reduced or ballast rate, the amount of bunker coal or other fuel must not exceed in volume the allowance specified in the Panama Canal certificate as the deduction for bunker space.

In any case in which the amount of coal on board exceeds the deducible allowance the vessel will be charged full tolls.

In any case in which coal be carried as a deck load, for the vessel's own consumption, or even though it be within the deducible allowance, it will be subject to measurement and charge, the rate depending upon whether or not the vessel be considered in ballast or loaded.

If when carrying a deck load of coal for her own use she carries no passengers or freight, and the amount of coal on board be within the deducible allowance, she may be considered in ballast.

Vessels that wish to benefit by the reduced or ballast rate of tolls should be very careful not to carry more than the deducible allowance under the rules.

On arrival, vessels must have ready a statement of their coal account, to which the master may be required to take oath. In case coal be carried outside of the regular bunkers, both it and that carried in the bunkers should be piled or arranged in a fairly uniform way so that it may be readily measured.

TIDE TABLES.

TWO publications have been issued by the Tidal and Current Survey of the Department of the Naval Service of the Dominion—one giving the tide tables for the Pacific Coast, and the other giving the Atlantic Coast of Canada, together with the River and Gulf of St. Lawrence, the Bay of Fundy, Northumberland and Cabot Straits. Information relative to currents is also given. Both are for the year 1915, and have been compiled under W. Bell Dawson, superintendent.

The tidal tables for the Eastern section show the tidal differences along the river and gulf at every point to the sea where such observation would be helpful to the mariner, and along the sea coast as well. The tables are based upon observations obtained by means of self-registering tide gauges, which are kept in continuous operation day and night throughout the year.

The accuracy of tide tables depends on the length of the tidal observations on which they are based, and on that basis it is claimed that the tables for all the ports of reference, such as Quebec, Father Point, St. Paul Island, Halifax, and St. John, are now superior to the tide tables for any harbor on the Atlantic coast of the United States from Maine to the Gulf of Mexico.

The tide tables for the Pacific Coast include Fuca Strait, the Strait of Georgia and the northern coast, with data for slack water in the navigable passes and narrows, and information on currents. It is also claimed that the tide tables for Clayoquot, Victoria, Sand Heads, Vancouver and Port Simpson are superior to the tide tables for any port on the Pacific Ocean in America, Asia or Australia.

Those for Prince Rupert are now equal to those for San Francisco, which are based on the longest record of any that are published for the Pacific Coast by the United States Coast Survey. Detailed sailing directions are given for captains navigating the narrows, with definite information as to times to try the passage and the classes of vessel that had better not try.

SOO CANAL TRAFFIC.

THE November report of lake commerce through the canals at Sault Ste. Marie shows a decrease from that of October of over three million tons. Grain and wheat shipments are larger, but the reduction in iron ore tonnage accounts for nearly all the reduction. The total freight carried through for the month was 4,044,368 tons, three-quarters of which was locked through the American side. The total number of vessel passages were 1,355, of which 950 used the American canal and 405 the Canadian. The details are as follows:

Eastbound.

Articles.	Amount.
Copper, short tons	24,454
Grain, bushels	14,936,019
Flour, barrels	1,221,841
Iron ore, short tons	1,115,779
Pig iron, short tons	2,666
Lumber, M. feet B. M.	38,060
Wheat, bushels	32,770,253
General merchandise, short tons	16,580
Passengers	292

Westbound.

Coal, hard, short tons	339,344
Coal, soft, short tons	868,382
Manufactured iron, short tons	22,535
Salt, barrels	100,362
General merchandise, short tons	121,468
Passengers	136

Summary: Vessel passages number 1,355; registered tonnage, net, 2,198,416; freight, eastbound, short tons, 2,677,685; westbound, short tons, 1,366,683. Total freight, short tons, 4,044,368.

FISHERY RULES TO BE REVISED.

NEW regulations governing the carrying on of fishery operations in international waters, such as Lake Ontario, the St. Lawrence, etc., will be prepared by the Naval Service Department at Ottawa this winter. They will be promulgated next spring, and will then go into effect to replace the regulations formerly in effect under the terms of the International Food and Fishes Treaty. This treaty, as was announced some time ago, has been allowed to drop by Canada, the United States not having put it into effect by necessary legislation.

Canada thus resumes her liberty of action, and will proceed to demonstrate that she has done so by replacing the regulations which have been in effect for some years past under the international treaty by new ones. The latter will probably be somewhat less strict, and more in accord with the United States regulations. This will remove a grievance on the part of Canadian fishermen, who have in the past been forced to observe the treaty regulations, while their rivals across the border were under no such restrictions. As Ontario is proprietor of its own fisheries, the Dominion authorities will confer with those of the province before taking action.

WELLAND CANAL PROGRESS.

SUPT. WELLER, in charge of the construction of the new Welland Ship Canal states that good progress is being made in digging the new waterway, and work will proceed all winter unless exceptionally severe weather sets in. Five sections are now under contract—sections one, two and three at the Lake Ontario end, section 4 and section 5, the latter being the section from Allenberg to Port Robinson, on which heavy cutting is being done. Nearly 3,000 men are engaged on the work.

Evidence of the progress made is found in the fact that the contractors are now putting in concrete in all the sections for the walls of the new canal. The estimate that the canal will be completed by 1918 still holds good, and it is expected that before long, contracts for sections six to nine will be let. Supt. Weller has seen nothing to substantiate the report of a projected attempt by Germans to wreck the canal and does not think any Germans have been near the work. The canal, he says, is well guarded.

THE ETIQUETTE OF FLAGS.

THE following notes relative to flags may be found useful concerning the uses and customs connected with them.

The ensign should be flown from the main gaff, or the mizzen gaff when the ship has a mizzen mast, and when the vessel is under way. When the vessel is about to anchor, it should be flown from the flagstaff. The Jack should never be flown until the anchor is down or the ship has moored.

In saluting a fleet of war vessels, the flag should only be dipped once to the senior officer's ship, which carries his flag at the fore.

When a vessel is in mourning and is about to salute, it is correct to run the flag to the masthead first. A flag should never be pulled down from half-mast until it has been mastheaded. The absolutely correct position of a flag at half-mast is such that there is room for another flag above it.

Where a death occurs on board, the whole of the flags should be half-masted, but when the owner dies the house-flag only should be half-masted and not the ensign. It is correct in the case of clubs to half-mast all the club flags on the vessels in port when a member dies.

Yachts should fly the ensign according to their rig, and thus sloop, cutter, or cat-rigged vessels fly the ensign at the main peak, schooners at the mainmast-head; launches, gigs, dinghies and steam and motor yachts while at anchor at the stern flagstaff, while yawl-rigged yachts have theirs at the mizzen or jigger mast-head. The club burgee and owner's flag are flown as below:—

Club Burgee.

Cat sloop and cutter-rigged yachts at the masthead.

Yawl-rigged yachts at the mainmast head.

Steam, motor and schooner-yachts at the fore mast-head.

Launches, gigs and dinghies at the bow flagstaff.

Owner's Flag.

Cat-rigged yachts at the masthead or forestay.

Yawl-rigged yachts at the mizzen masthead or peak.

Sloop or cutter-rigged when cruising in squadron at the masthead.

All steam and motor launches and boats when club flag is not flown, at the bow flagstaff.

When the owner is at meals, a white rectangular flag is flown from the main starboard spreader, and it is an absolute breach of etiquette to go on board any yacht while this is flying. The fact of the crew feeding is demonstrated by a red triangular flag from the fore-port spreader on schooners, and the mainport spreader in single-masted vessels.

When Divine service is taking place on board, a white triangular flag with a blue cross is flown above the ensign, this being the only case where a flag of any sort whatsoever is flown above it.

In port, flags should be hoisted at 8 a.m., time being taken from the senior flagship present, or from the shore signal station, and at sunset the lowering should be attended to in the same fashion.—Motor Ship.

WESTERN DRYDOCK AND SHIPBUILDING CO. OUTPUT.

THE accompanying detailed statement of new and repair work carried out by the Western Drydock and Shipbuilding Co., Port Arthur, Ont., during the present year may be considered a very fair showing, particularly where account is taken of the fact that shipping activities on our inland waters was affected to quite an abnormal degree by the general business depression more or less in evidence since the opening of navigation last spring.

New Construction.

Steamer W. Grant Morden built and completed in 6½ months for Canada Steamship Lines, Ltd. Dimensions:—Length, 625 ft. over all; length, 604 ft. between perpendiculars; beam, 59 ft.; moulded depth, 32 ft.; tonnage, gross, 8,974 tons; tonnage, net, 6,595 tons. built on Isherwood longitudinal frame system; 38 hatches, 12 ft. centres; side tanks to main deck; triple expansion engines, cylinders, 24-39-65 inches diameter by 42 in. stroke; indicated horsepower 2,000, 83 r.p.m., built by American Ship Building Co. at Cleveland, Ohio. Boilers, 2 Scotch marine type with induced draft, 16 ft. dia. x 11 ft. 5 in. long; 3 furnaces, with grate surface of 132 ft.; heating surface 63,038 sq. ft. and pressure of 170 lbs. per sq. in. Boilers built and installed at Port Arthur.

Repairs.

Steamers Alberta and Athabasca, of the Canadian Pacific Upper Lake Passenger Service, had new boilers built and installed; alterations to bulwarks and crew quarters forward. Extensive repairs to engine were also made.

DOCKINGS AND REPAIR WORK.

Vessel.	Gross tonnage.	Owner's Name.	Nature of Repairs.
Str. Sarnian	2584	American Interlake Line.	Bottom damage.
Tug J. Whalen		Can. Towing & Wrecking Co.	General repairs.
Str. J. H. Plummer	1582	Merchants Mutual Line	Repairs and loose rivets and caulking.
Str. W. H. Dwyer	1770	Merchants Mutual Line	Bottom and bow damage.
Str. W. Grant Morden	8974	Canada S.S. Lines	Bilge damage.
Str. Scottish Hero	2201	Canada S.S. Lines	Loose rivets.
Str. Glenfinnan	2409	Great Lakes Trans. Co.	Stern bearing
Str. Martian	3396	Canada S.S. Lines	Bottom repairs.
Str. Midland King	3965	Canada S.S. Lines	Wheel and shoe.
Tug Traveler	438	Canada S.S. Lines	General repairs.
Str. Corunna	1256	Dominion Iron & Steel Co.	Bilge damage.
Str. Turret Chief	1881	Canada S.S. Lines	Survey.
Str. Dundee	2278	Canada S.S. Lines	Wheel and shoe.
Str. Midland Prince	6636	Canada S.S. Lines	Bottom damage and shoe.
Str. George A. Graham	2409	Canadian N.W. S.S. Line	Bottom damage.
Str. Agawa	3759	Algoma Central S.S. Line	Bottom bilge.
Str. Beaverton	2011	Canada S.S. Lines	Bottom damage, main deck and heavy weather.
Str. Grant Morden	8974	Canada S.S. Lines	Bottom damage.
Making a total of	56,523	gross tons up to date.	

BRITISH AND GERMAN SHIPPING.

AT a time when the Germans show signs of activity at sea, it is interesting to note the effect of war operations upon the shipping of Germany and Great Britain. The British Board of Trade on November 26 issued a statement showing the state of British and German shipping respectively after sixteen weeks of war. The total number and tonnage of steamships exceeding 100 tons gross owned by the two countries at the outbreak of war were:—British, 10,123 ships, 20,523,706 tons; German, 2,090 ships, 5,134,720 tons.

Of these, the following by November 26 had become unavailable to their owners for various reasons:—Unavailable to the British:—Captured, 49; detained in German ports, 75; held up in Black Sea and Baltic ports, 71; total, 195 ships, 585,551 tons. The proportion of ships rendered unavailable was 1.9 per cent., and the proportion of tonnage affected was 2.9 per cent.

Unavailable to the German:—Captured, 80; detained in British or allied ports, 166; seeking refuge in neutral ports, 646; in German ports, 329; total, 1,221 ships, 4,584,926 tons. The proportion of ships rendered unavailable was 58.4 per cent., and the proportion of tonnage rendered unavailable was 89.3 per cent.

The number of British ships plying on November 26 was 9,928, or 98.1 per cent. of the whole; and the tonnage was 20,122,173 gross tons, or 97.1 per cent. of the whole.

The statement of German merchant ships, either plying or not accounted for, is as follows:—Known to be at sea, 10; ships over 500 tons not accounted for, 125; steam trawlers not accounted for, 353; small coasters not accounted for, 381; total, 869—549,794 tons. The proportion of ships plying or not accounted for is 41.6 per cent., and of tonnage only 10.7 per cent.

Only ten German steamers are known to be at sea, as against ten thousand British steamers.

EVOLUTION OF THE LIGHTSHIP.*

By G. C. Cook.

OF the many writers who have discussed the subject of sea marks, none appear to have assigned to the lightship a place wholly commensurate with its importance as an aid to navigation or an example of engineering skill. A visit to the Library of Congress, Washington, D.C., first indicated this to me, because I was there unable to find the specific title " The Lightship." Inquiry and search, however, yielded many references in the evolution of this aid to navigation, from which I have assembled the more important facts and endeavored to place them in logical order. This record is far from complete, but it is my intention to add to it from time to time until I have the full story of this bravest of little vessels.

The lightship is a beacon by day, a platform for the light by night, and a sound signal station in time of fog. As a day mark, it may have any form; it can carry a light which throws out an unvarying beam to the horizon, and bear fog signals of any type. Its efficiency in these capacities is established. In addition, it has certain important functions which are indicated in the following paragraphs:—

Lightship Functions.

The lightship may be stationed in deep water many miles from land, and mark a point from which arriving and departing vessels take bearings to proceed to their destination. The Nantucket Lightship, moored in 180 feet of water, 60 miles south-east of Cape Cod, has been the landfall of Transatlantic trade and travel since 1855.

The lightship may be moored on shifting shoals and banks where no foundations for fixed structures could be laid. When the danger point of the shoal shifts, a corresponding change is promptly made in the position of the light. The Gulf Stream Lightship on the Goodwin Sands off the south-east shore of Kent is an excellent example. Nantucket and the Goodwins, with other points, similar in many respects, have always been marked by the lightship.

The city of Milwaukee was marked by North Point Lighthouse only for many years. Many wrecks were due to vessels holding in to the shore to pick up the light and avoid running by the city. Now Lightvessel No. 95 stands three miles off the harbor entrance. It is an aid of strictly positive character, showing the approaching mariner a place of security, rather than warning him from a danger point. His vessel will necessarily remain afloat where the lightship itself is safely riding. He cannot run ashore when standing in to pick up the light, nor does his safety depend upon calculating his distance from the signal. The light showing the true way is more useful than the one merely marking a danger to be avoided.

The lightship may be a place of refuge for a crew in distress. Small boats from a ship which has met disaster nearby may reach the lightship, when they could by no means live through the surf and reach the shore. In 1892 the French authorities recommended the replacement of certain lightships with gas buoys; certain of these changes were accepted by the seafaring public without criticism, but against others the strongest protests were received. In the case of the Plateau des Minquiers, the committee appointed to take evidence on the protests learned the cause. It was not the inferiority of the gas buoy's light, but discontinuance of the shelter afforded by the lightship in certain stresses of weather and tides.

One of the necessary aids to navigation is the fog signal. The sound of a bell, whistle, or siren coming from a lightship well out from shore necessarily reaches vessels farther out at sea than those proceeding from the land. There are no sound shadows to lessen the effect of the lightship fog signal, nor is any part of the sound wasted by being thrown inland. The lightship signal, however, is heard from the land, and guides the ship putting out from harbor as well as that seeking its way in.

It is only from a lightship that the transmission of submarine bell signals is satisfactory. Their range and accuracy of directions gives to this form of signaling additional importance every year. Not only do these signals travel faster and farther than in air, but at the depth where the bell is hung, their successful transmission is not prevented by the heaviest gale. Practically every ship of importance is now equipped with receiving instruments and enabled to pick up these signals from lightships when all others fail.

The lightship with the latest radio equipment is invaluable as a relay station. Its position, at the centres of the lanes of sea travel, enables it to pick up and pass on messages which otherwise would fail to reach their destination. This equipment also enables them to flash to life-saving stations notice of vessels in distress. During the winter of 1912 the most severe storm of years swept along our Atlantic coast. Many wireless shore stations were destroyed. The shipping on the coast sought sheltered harbors, but Lightvessel No. 94, on the Frying Pan Shoal, hung on at her moorings, showed her signal lights and transmitted all messages with absolute regularity. The radio fog signal is now in course of development.

In many cases the lightship serves as a pilot station. An example is the La Plata, indicating the passes south of the river of that name. Pilots are always to be found on board.

Universal Application.

The lightship has universal application. It can become mobile or fixed at any time as occasion requires; the moorings now in use make it practically permanent in its given place, while allowing it to be removed without trouble to another anchorage when this becomes desirable. It is available at any time to meet any emergency. It has been moored near a lighthouse in course of construction, and could be used again there if the lighthouse were destroyed.

The lightship has been, and, no doubt, will again be driven from its station. Instructions, issued at Washington in 1829, direct masters " . . . . not to ship or cut the cable, or suffer it to be done in any event, and if the vessel should be likely to founder, to abandon her with his crew . . . ." The lightship never voluntarily leaves its station.

Many years ago Robert Hamblin proposed to substitute the lightship for all English lights. His proposition fell through, but not by inherent fault, because if all lights were destroyed to-day they could be promptly and satisfactorily replaced by lightships. Its adaptability is perfect. There is no rock or shoal in river, lake, or sea which cannot be efficiently marked by it.

The Early Lightships.

The lightship is essentially a product of modern times. It had, as in the case of all modern products, a prototype in the ancient world. This was the Roman coast guard galley which existed in the last few centuries before Christ. The galley carried at its masthead an open framework basket in which a fire was sometimes burned at night as a signal light. The galley thus lighted, and manned by an armed crew, patrolled the Roman coasts and served as a guide and protection to approaching vessels, and but for such a patrol the pirates who infested the coast would have carried their depredations into the very harbors themselves. The sighting of the light galley was, therefore, doubly welcome to the mariner arriving from a voyage. It showed that his destination was near, and that his ship and cargo were safe from the elements and capture.

After this brief record, then, the lightship, if so it may be called, sinks into obscurity for many centuries. The lighthouse, however, which was both its predecessor and contemporary along the shores of the Mediterranean, was continued through the Dark Ages as the sole aid to navigation.

*From a paper read before the Society of Naval Architects and Marine Engineers, New York.

ASSOCIATION AND PERSONAL

A Monthly Record of Current Association News and of Individuals
Who Have Been More or Less Prominent in Marine Circles

Thomas Henry has been appointed general traffic manager of the Toronto Steamboat Co., and P. Patton, it is said, will go to Montreal and become the chief purchasing agent.

Capt. Clive Phillips-Woolley, of Victoria, B.C., the well-known retired naval officer and song writer, has been appointed a censor and special government officer for the Pacific coast.

Captain Oliver Gillespie, one of the best known river captains from Montreal to Toronto, passed away at the residence of his son-in-law, P. E. Campbell at Cornwall, Ont., on Nov. 29, aged 87 years.

Captain R. H. Fleming, harbor master of St. John, N.B., died there on Nov. 29, after a brief illness. For many years Capt .Fleming commanded the steamer Monticello, which was lost with several lives on the Digby-St. John route.

Charles Gedeon Beaulieu, of the city of Quebec, has been oppointed an officer to superintend the survey and measurement of ships at the port of Quebec, in the room and stead of J. A. Smith, resigned, and to be surveyor of accommodation for seamen.

Capt. Daniel Noonan, a prominent citizen of Kingston, and marine man, passed away at the Hotel Dieu on November 26, after a long illness. The deceased, who was born at Troy, N.Y., was sixty-one years of age. The last thirty years of his life were spent in Kingston, where he was widely known in connection with the Rideau Lakes Navigation Co.

Capt. F. Carey of the C. P. R. Atlantic lines, received a handsome gift on Nov. 17 in Liverpool in testimony of fifty years' service. He commanded the Empress of Ireland, but some time afterwards went back to his old ship, the Tyrolia, formerly the Lake Erie. He crossed the Atlantic six hundred times and travelled more than one-half million miles by sea.

Triple Presentation.—A pleasant affair in the form of a triple presentation took place recently in the head office of the Polson Iron Works & Shipbuilding Co. The recipients were Col. J. B. Miller, president and general manager of the company, who was given a gold-headed cane; Mrs. J. B. Miller, who received a gold-headed parasol, and Miss Margaret Miller, who was presented with a handsome necklace and locket. The presentations were made by William Newman, naval architect and works manager, on behalf of the office staff and employees in the various departments of the works. Col. Miller made a happy reply for himself and family, and thanked the officials, staff and men for their very kindly remembrances. Col. Miller and his family have left for South Carolina, where they will spend the winter.

James Thom, formerly manager of the White Star-Dominion Line offices in Canada, died at his home in Montreal, on Nov. 26. He had been ill for some time. Mr. Thom was formerly at the head of the old Beaver Line of steamships, which was merged with the Elder-Dempster Line some years ago. He was born in Montreal in 1839, and commenced his connection with shipping with the Beaver Line, with which he remained until 1893, resigning to take over the management of the freight business in Canada of the Hamburg-American Line. In 1899 he was appointed manager for the Furness-Withy Co. in Montreal, accepting the position of manager of the White Star-Dominion Line in Canada in 1903. While he never resigned this position, he has taken no active part in the company's affairs for some time on account of ill-health.

LICENSED PILOTS.

River St. Lawrence.—Captain Walter Collins, 43 Main Street, Kingston, Ont.; Captain M. McDonald, River Hotel, Kingston, Ont.; Captain Charles J. Martin, 13 Balaclava Street, Kingston, Ont.; Captain T. J. Murphy, 11 William Street, Kingston, Ont.

River St. Lawrence, Bay of Quinte, Murray Canal.—Captain James Murray, 106 Clergy Street, Kingston, Ont.; Capt. James H. Martin, 259 Johnston Street, Kingston, Ont.; John Corkery, 17 Rideau Street, Kingston, Ont.; Captain Daniel H. Mills, 272 University Avenue, Kingston, Ont.

ASSOCIATIONS

DOMINION MARINE ASSOCIATION.
President — L. C. Henderson, Montreal.
Counsel—F. King, Kingston, Ont.

GREAT LAKES AND ST. LAWRENCE RIVER RATE COMMITTEE.
Chairman—W. F. Herman, Cleveland, Ohio.
Secretary—Jas. Morrison, Montreal.

INTERNATIONAL WATER LINES PASSENGER ASSOCIATION.
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THE SHIPPING FEDERATION OF CANADA
President—Andrew A. Allan, Montreal; **Manager and Secretary**—T. Robb, 218 Board of Trade, Montreal; **Treasurer**, J. R. Binning, Montreal.

GRAND COUNCIL, N.A.M.E. OFFICERS.
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Neil J. Morrison, P. O. Box 238, St. John, N.B., Grand Secretary-Treasurer.
E. Read, Vancouver, B.C., Grand Conductor.
A. J. Ross, Halifax, N.S., Grand Doorkeeper.
James Gillie and A. E. Kennedy, Kingston, Ont., Grand Auditors.

Directory of Subordinate Councils for 1914.

Name.	No.	President.	Address.	Secretary.	Address.
Toronto,	1	Chas. M. Arnott.	94 Hanley Street,	A. J. Fisher,	641 Bathurst St., Toronto.
St. John,	2	Wilmot Pitt	Indiantown, P. O.,	G. T. G. Blewett,	36 Murray St., St. John, N.B.
Collingwood,	3	W. T. Rennie,	Collingwood,	Robert McQuade,	P. O. Box 97, Collingwood.
Kingston,	4	S. M. Murray,	20 Rideau St.,	James Gillie,	101 Clergy St., Kingston, Ont.
Montreal,	5	A. F. Hamelin,	3210 Le Tang Street,	O. L. Marchand,	2378 Clark St., St. Vincent de Paul, P.Q.
Victoria,	6	John E. Jeffcott,	Esquimault.	Peter Gordon,	808 Blanchard St., Victoria, B.C.
Vancouver,	7	Andrew T. Roy,	3812 18th Ave., W.,	E. Read.	Room 8, Jones Bldg., Vancouver, B.C.
Levis,	8	Michael Latulippe,	Lauzon,	S. G. Guenard,	Bienville, Levis, P.Q.
Sorel,	9	John Matte.	Sorel.	Al. Charbonneau,	P. O. Box 132, Sorel, P.Qa.
Owen Sound,	10	Wallace Robertson,	1030 4th Ave. West,	James Nicoll,	714 4th Ave., Owen Sound, Ont.
Windsor,	11	Alex. McDonald,	28 Crawford Ave.	Neil Maitland,	221 London St., W., Windsor, Ont.
Midland,	12	Jos. Silverthorne,	Midland,	Jno. A. Murphy,	Midland, Ont.
Halifax,	13	Robt. Blair,	99 Preston Street,	Chas. E. Pearce,	Portland St., Dartmouth, N.S.
Sault Ste. Marl	14	A. E. Lewis,	Box 563, Soo, Ont.,	Geo. S. Biggar,	43 Grosvenor Ave., Sault Ste Marie.
Charlottetown,	15	J. F. McGuigan,	38 Queen Street,	Lem Winchester,	302 Fitzroy St., Charlottetown, P.E.I.
Twin City,	16	Wm. Faloona,	392 Ambrose Street,	Lloyd Williams,	142 Secord St., Fort William, Ont.

Insurance & Professional DIRECTORY

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